the OIL AND GAS JOURNAL

3 ways to learn why Lane-Wells Selective Bullet Perforating gives better results

1 ASK your Lane-Wells Man

2 ASK a Lane-Wells Customer

3 USE this Check List —and prove it to yourself

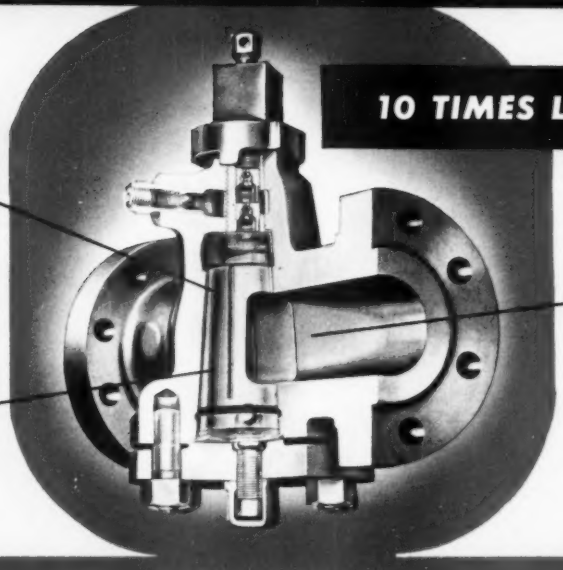
	LANE-WELLS	FEATURES
✓	Measure Accuracy	Triple Check assures Repeatability
✓	Bullet Design	Steelflo for Point Strength and Minimum Burr.
✓	Gun Range	1¾" to 9⅜"
✓	Shot Capacity	From 1 to 128 Shots on One run
✓	Perforating Density	Any Desired Number of Holes per Foot
✓	Safety	5-point Safety Check System
✓	Complete Coverage	Service in All Major Oil Areas
✓	Factual Information	Complete, Up-to-date Information available at all times.
✓	Well Service Records	Permanent Confidential Record of Service on Every Well

Any way you want to check it, you'll find that the Lane-Wells combination of long experience (145,000 jobs), full range of modern equipment, selective firing, and thorough knowledge of oil field problems, makes for successful perforating jobs—jobs that give operators RESULTS!

BETTER PERFORATING

by LANE WELLS

PRICE 50 CENTS TABLE OF CONTENTS PAGE 41 JUNE 28, 1951



ABRASION RESISTANCE IN MUD LINES

Nordstrom Valves

NOW AUTOMATICALLY LUBRICATED WITH Hypermatic TRADE MARK

PATENTS APPLIED FOR

ROCKWELL MANUFACTURING COMPANY

400 North Lexington Avenue • Pittsburgh 8, Pennsylvania

Atlanta, Boston, Chicago, Columbus, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa . . . and leading Supply Houses. Export: International Division, Rockwell Manufacturing Company, 7701 Empire State Bldg., New York 1, N. Y.

To help meet the growing demand for aviation gasolines ...

A COMPLETE LINE OF DU PONT ADDITIVES

The demand for aviation gasolines is constantly rising. To help you maintain quality standards easily and economically, Du Pont offers a complete line of gasoline additives. These are especially adapted for use in aviation fuels and are compatible with each other in every way.

In connection with these additives the services of the Petroleum Chemicals Division Field Laboratories are available to you. The laboratories will evaluate your gasoline and recommend the most efficient use of any of our products. For full details, write the nearest Du Pont Petroleum Chemicals District Office listed below.

TETRAETHYL LEAD COMPOUND—*Aviation Mix*

Du Pont Tetraethyl Lead Compound—Aviation Mix is backed by 25 years of manufacturing experience and supported by extensive research. It is supplied to you with complete, helpful services applying to blending operations and safety.

GASOLINE ANTIOXIDANT No. 22

To assure maximum stability of your aviation gasolines we offer Du Pont Antioxidant No. 22. This is a commericial grade of N,N′ di-secondary butyl-para-phenylene-diamine.

GASOLINE DYES

For aviation gasolines, many refiners prefer Du Pont Oil Blue A to meet color specifications. This dye can be combined with Du Pont Oil Yellow N to obtain green, and with Du Pont Oil Red if purple is required.

MAKE DU PONT THE SOURCE FOR ALL OF YOUR GASOLINE ADDITIVES

HANDY BLENDING CALCULATOR

This Du Pont Blending Calculator was specially designed to help expedite the blending of your aviation gasoline with Tetraethyl Lead Compound—Aviation Mix. A real time-saver, it is yours for the asking! Your Du Pont Petroleum Chemicals representative or the nearest District Office will be glad to supply you.

DU PONT
REG. U. S. PAT. OFF.

Better Things for Better Living
. . . *through Chemistry*

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

District Offices: New York, N. Y. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · Los Angeles, Calif.

District Laboratories: Wilmington, Del. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · El Monte, Calif.

IN CANADA: Canadian Industries Limited—Toronto, Ont.—Montreal, Que.

Built Up..

to Oil Field Standards!

Fairbanks-Morse 8-Cover Side-Pot Duplex Power Pumps are built *UP* to the rugged design and conservative standards of oil field pump practice . . . built *UP* to last . . . built *UP* to liberal strength and safety factors.

They are not built down to achieve lighter weight with consequent sacrifice in design, materials and dependability. Light weight in an oil field power pump is a dubious advantage at best. Strength and service are the important considerations.

When you want dependable, efficient, long-life, low-cost service, your choice should be Fairbanks-Morse, the power pumps that set performance and economy records wherever they are used. Fully bronze-fitted, oil-fitted, or slush-fitted styles. Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE,

a name worth remembering

OIL FIELD EQUIPMENT • PUMPS • SCALES
ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS
DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS

For better service and more economy use

MACWHYTE WIRE ROPE

A thousand and one
to order from assures the right rope for your equipment

BULLETIN 5025 gives information on "How to order Wire Rope" and lists all sizes and constructions of Improved Plow Steel Monarch Whyte Strand Wire Rope. Copy sent on request.

Over the years, ropes for all types of equipment in every field have been developed by Macwhyte. It will pay you to specify Wire Rope . . . engineered and job-proved for your particular equipment.

Recommendations are promptly available from Macwhyte distributors or Macwhyte Company.

MACWHYTE COMPANY

2916 Fourteenth Avenue, Kenosha, Wisconsin

Mill depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles. Distributors throughout U.S.A. and other countries carry stocks for immediate delivery.

Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope. Catalog on request.

1008

IDEAL

AUTOMATIC GRIP ELEVATORS and SPIDERS are designed for Safety, Strength, Speed

IDEAL Automatic Grip Elevators and Spiders are built for safe, fast, and dependable service. The grip will support a 20,000 foot casing string without marring or collapsing the casing.

Slips operate in unison automatically . . . can be replaced easily and economically at the rig. The Spider will not release until Elevator holds the casing load. These Elevators and Spiders work with speed because they are operated by one man, on the floor, or in the derrick.

These are some of the advantages of our Automatic Grip Elevators and Spiders. Write for your copy of bulletins describing IDEAL Elevators and Spiders, or see your National Supply representative for details.

THE **NATIONAL SUPPLY** COMPANY

GENERAL SALES OFFICES: TOLEDO, OHIO

DIVISION OFFICES: Casper; Ft. Worth; Pittsburgh; Tulsa; Torrance
CANADA: The National Supply Company, Limited, Room 202, Alberta Block, Calgary, Alberta
EXPORT: National Supply Export Corporation, 600 Fifth Avenue, New York 20, N.Y., U.S.A.
River Plate House, 12 South Place, London E.C. 2

NSCO NATIONAL BLUE PRODUCTS

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

Service Factor - For Long Life

LINK-BELT Chains and Sprockets Specified for Service in this 4-Engine 2-Pump Compound Drive for Power Rigs

CAPABLE of handling the 1600 h.p. transmitted through this compound drive, Link-Belt chains and sprockets were chosen after extended tests. The chains and sprockets in this unit *must* give trouble-free service. Link-Belt 1½" pitch quadruple roller chain is used on the six 30-tooth and one 23-tooth sprockets: Link-Belt 1¾" pitch quadruple roller chain is used on one 33-tooth and one 26-tooth sprocket.

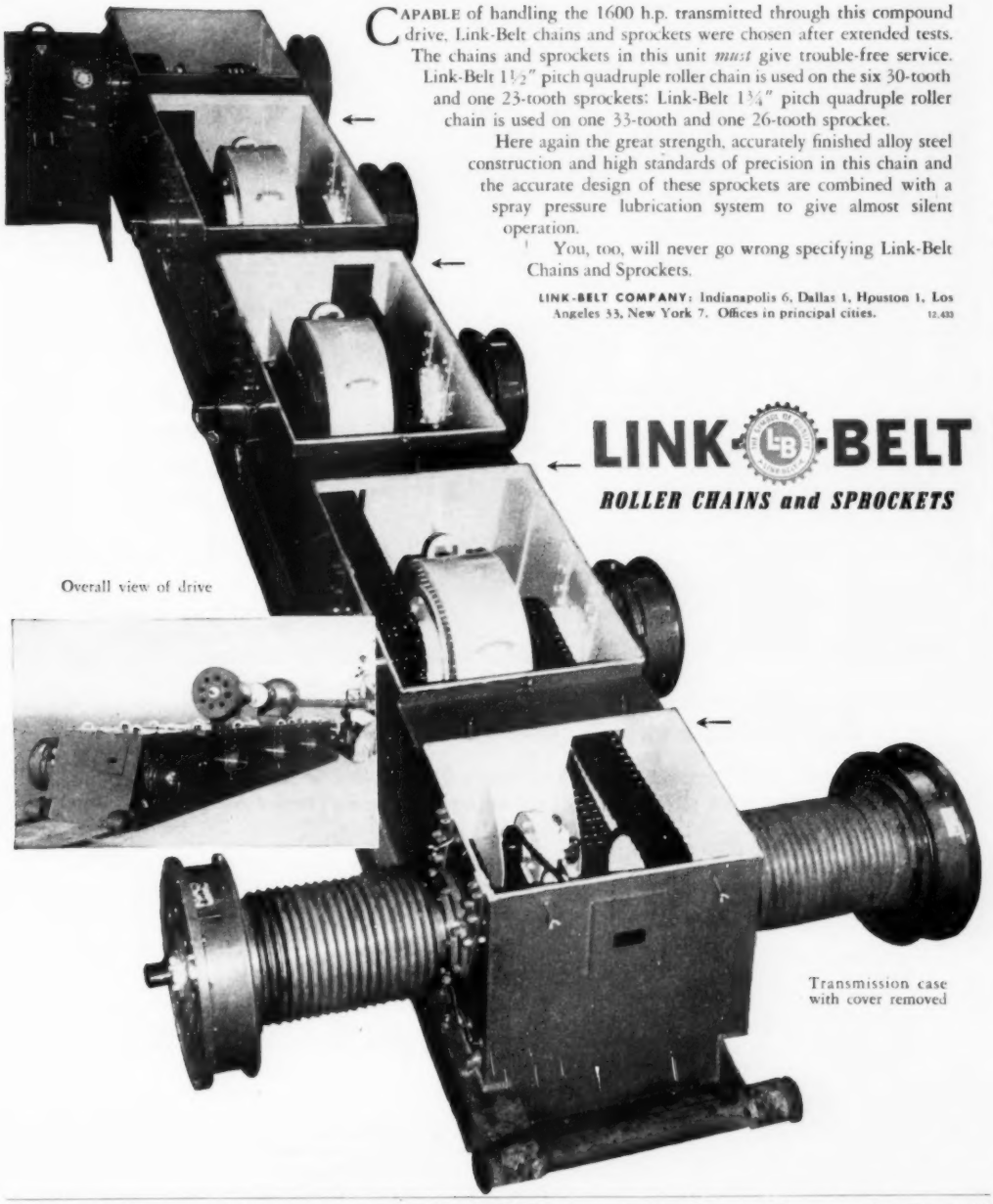
Here again the great strength, accurately finished alloy steel construction and high standards of precision in this chain and the accurate design of these sprockets are combined with a spray pressure lubrication system to give almost silent operation.

You, too, will never go wrong specifying Link-Belt Chains and Sprockets.

LINK-BELT COMPANY: Indianapolis 6, Dallas 1, Hpuston 1, Los Angeles 33, New York 7. Offices in principal cities. 12.433

LINK-BELT

ROLLER CHAINS and SPROCKETS

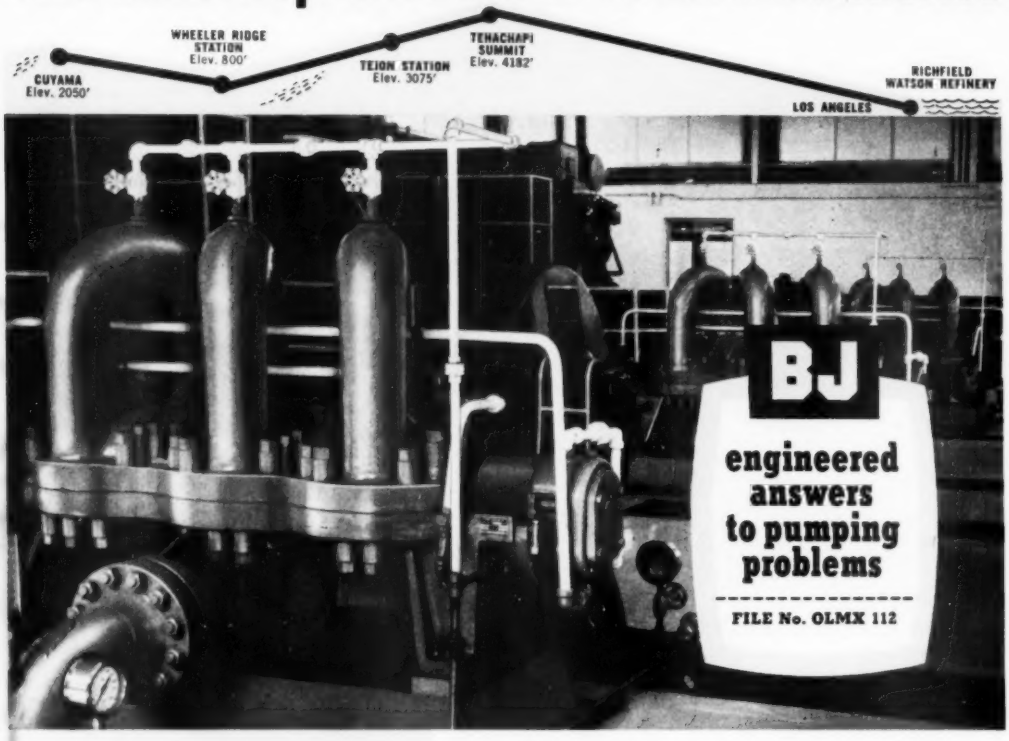


Overall view of drive

Transmission case with cover removed

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.

BJ PUMPS push Richfield's Cuyama Crude over Tehachapi Mountains to L.A. Refineries



FILE FACTS:

PUMP SIZE: 6 x 8 six-stage OLMX, type RB

PUMP CAPACITY: 37,500 B/D each at 1000 psi

PUMPING SPEED: 3600 RPM

OLMX DESIGN AND CONSTRUCTION FEATURES:

- **HORIZONTALLY SPLIT CASE** with suction and discharge nozzles cast integral with lower half.
- **STAGGERED VOLUTE** construction for radial balance.
- **STAGE ARRANGEMENT** provides axial balance without use of balancing drums.
- **EXTERNAL CROSSOVER PASSAGES** produce smooth, uninterrupted flow of liquid—increase pumping efficiency.
- **IMPELLERS** are enclosed single suction type, mounted back to back in pairs, and securely keyed to the shaft.
- **BEARING HOUSING** and stuffingbox water jackets are cooled by pumped liquid.

75,000 b/d through 112-mile-long, 14-inch line

When Richfield brought in California's Cuyama Valley as a major producer, they were faced with the problem of transporting this increased production over the Tehachapi Mountains to their Los Angeles refineries. The answer was a 112-mile-long, 14-inch pipe line which rises to an elevation of 4182 ft. at the summit. Two Byron Jackson OLMX centrifugal pumps, operating in parallel, are installed in each of two pumping stations at Wheeler Ridge and Tejon, with a third pump in reserve. These pumps, driven by Nordberg diesels through Western Gear speed increasers, deliver 75,000 barrels per day at 1000 psi.

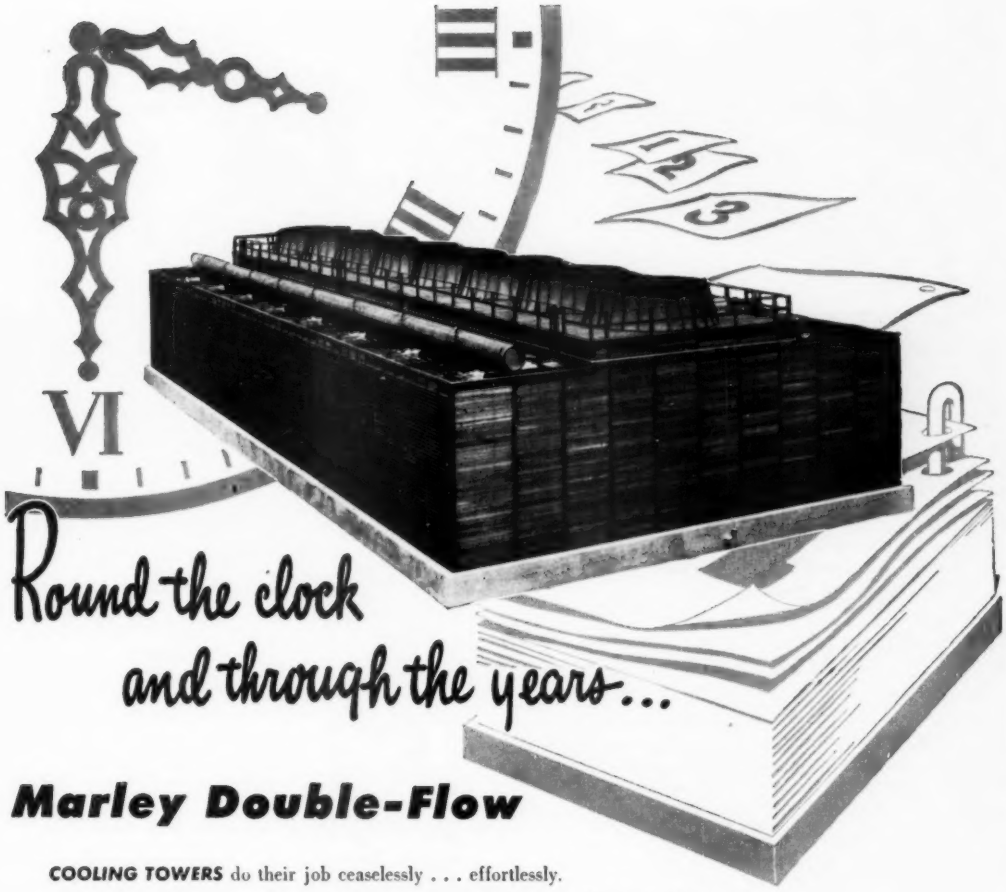
For the engineered answer to your pumping problems, contact:

Byron Jackson Co.

Since 1872

P.O. Box 2017, Terminal Annex, Los Angeles 54, Calif.

BJ builds a complete line of pipe line pumps—from mainline giants to small loading or sump models.



Round the clock and through the years...

Marley Double-Flow

COOLING TOWERS do their job ceaselessly . . . effortlessly. Designed for long-service life, Double-Flow dependability is further assured by the patented design that makes possible "at-a-glance" inspection, on-the-spot maintenance—all without service shutdowns or lag in plant production.

The famous Marley open distribution system keeps the operator informed at all times on water conditions, and may be cleaned in minutes, during operation. By merely opening a door, the operator can walk through the entire tower, inspecting all essential parts as the Double-Flow continues to do its duty.

Marley fans, Geareducers, drive shafts—all designed for cooling tower service exclusively—are keyed to this same service simplicity. Mechanical equipment . . . distribution . . . filling . . . basin . . . from top to bottom and side to side, Double-Flow towers and *only* Double-Flow towers are an open book to the tower operator—a book that tells a story of ceaseless, effortless operation.

The Marley Company, Inc.
KANSAS CITY 15, KANSAS

MARLEY

* COMPARE

THIS FEATURE

OF THE HONEYWELL SERIES "700" VALVE

*Compare the Upper Stem Guide of this valve with that of any other wide band proportional type. Look at it closely . . . study it feature by feature.

Then check the other features of the valve . . . the Specially Designed Diaphragm, the One-Piece Bonnet, the Packless Bellows Seal, the Safety Stem Lubricator, the wide variety of discs, the easy reversibility in the field.

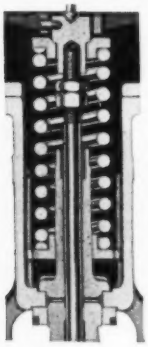
Your comparison will prove that the Honeywell Series 700 has *all* of the features you look for in a fine valve.

It's available in a wide range of styles and sizes. For detailed information, write for a copy of Bulletin 700-3 or call in your local Honeywell engineer . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 1906 Windrim Ave., Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

New Bulletin 750, "Control Valve Sizing Data," is now available

DUPLEX UPPER STEM GUIDE



Two bearings guide stainless steel upper valve stem. Top bearing is self-oiling; lower bearing is lubricated by an easily accessible grease cup. Continuous lubrication assures almost frictionless super structure responsive to slightest change in signal air pressure.

Specially Designed Neoprene Diaphragm

One-Piece Bonnet

Packless Bellows Seal

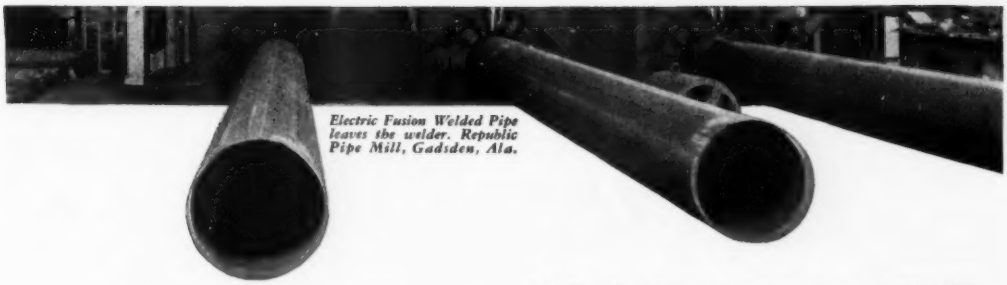
Safety Stem Lubricator

Wide Variety of Discs

Reversibility in the Field

MINNEAPOLIS **Honeywell**

VALVE PRODUCTS



Electric Fusion Welded Pipe leaves the welder. Republic Pipe Mill, Gadsden, Ala.

BIG PIPE *doing a big job...*

It's Republic Expanded Electric Fusion Welded Pipe, now being produced in BIG sizes—24 through 30-inch OD. And, it's doing a big job in helping natural gas move to new nation-wide markets.

This large diameter high pressure line pipe is electric fusion welded inside and out. It is hydraulically expanded to uniform size, straightness and circumference. This hydraulic expansion also increases its yield strength for even safer handling of high pressures.

In every size, this big pipe helps hold field welding costs down. Because its circumference always is constant, field joints line up accurately and quickly. The entire circumference can be welded at top speed . . . lowest cost. Line construction moves fast!

What's more, its uniform wall thickness provides an even distribution of metal which further speeds field welding of circumferential joints.

All the facilities of Republic's completely integrated pipe mill at Gadsden, Alabama, are 100% devoted to production of Expanded Electric Fusion Welded Pipe. Republic is doing everything possible to see that the big pipe is ready for its big jobs.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Another new natural gas line goes in. Crew is applying field coating and wrapping to Republic Expanded Electric Fusion Welded Pipe in Texas.

Republic

REPUBLIC STEEL

ELECTRIC FUSION WELDED LINE PIPE

Choose the Valves You Need from...

the Complete Line of

R·P&C VALVES

FIG. 409
Bronze
Globe
Valve

When you choose R-P&C Valves,

you can be sure of the same high quality of each one—from tiny ⅛" valves . . . to high-pressure, high-heat valves . . . and giant valves for handling huge volumes of liquids.

- You can get bronze, iron, steel—bar stock—iron cocks—and cast steel fittings. Two new numbers are PRESSURE SEAL BONNET and FORGED STEEL GATE. More new ones to come.

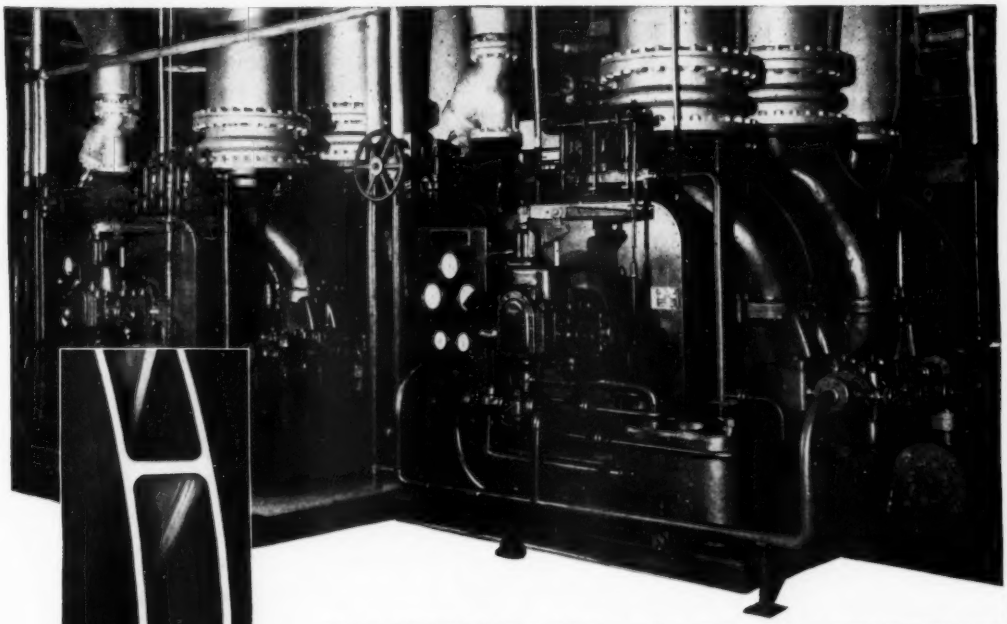
- Call your local R-P&C distributor today or write the nearest R-P&C district office.

ACCO

R-P & C VALVE DIVISION
AMERICAN CHAIN & CABLE

"Intentionally Better"
READING-PRATT & CADY VALVES

Big blowers for a vital job



WELDED IMPELLERS are one of the many reasons why Elliott blowers are getting ever-increasing acceptance for process work. Note the smooth contours, heavy blades, and generally rugged construction (as compared to conventional riveted impellers). Each impeller is a completely homogeneous unit and can be made of any weldable material having reasonable mechanical strength.

"CAT CRACKING" CALLS FOR ELLIOTT DEPENDABILITY

for the unfailing supply of the large volumes of air needed to convey and reactivate the catalyst. Elliott blower units are now operating in many refineries, continuously serving the catalytic process. The two large Elliott blowers shown above are typical, supplying 55,200 cfm of air at 18 psig. Each blower is driven by a 2200-hp Elliott steam turbine exhausting upward to an Elliott surface condenser.

Continuity of operation is an essential of "cat" crackers and other process requirements—an emergency shutdown may result in serious damage to equipment and prolonged loss of production. Elliott units have been designed with this requirement in mind and operating records prove conclusively that they have the rugged dependability necessary to meet the exacting requirements. Contact your nearest Elliott representative for details.

ELLIOTT BLOWERS

P-1089

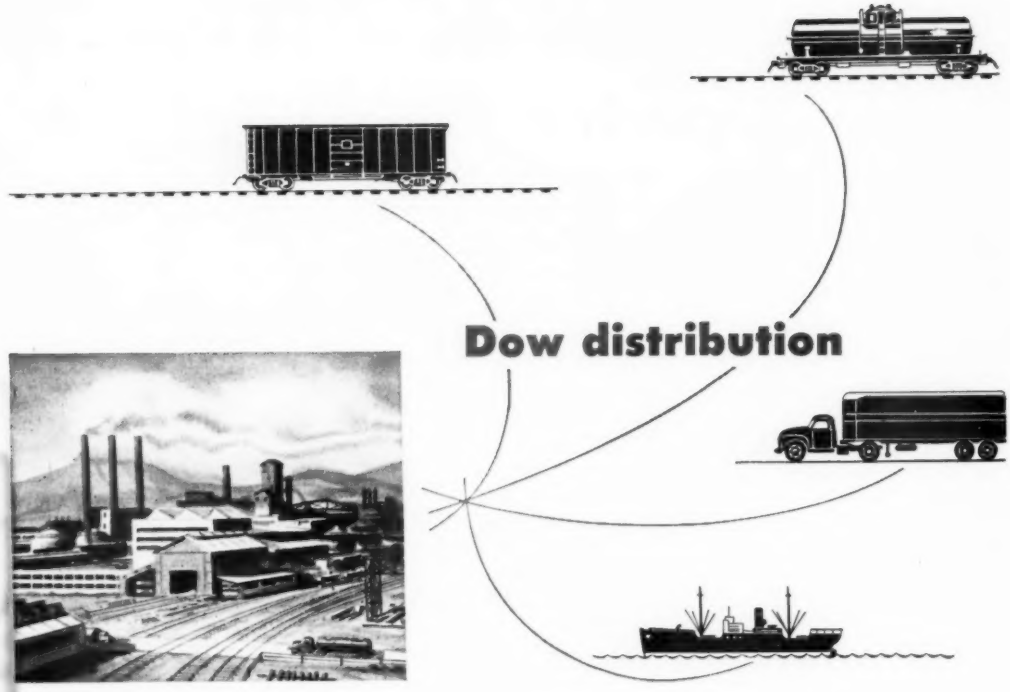
ELLIOTT COMPANY

***Centrifugal Blower Dept.*, JEANNETTE, PA.**

Plants at: JEANNETTE, PA. • RIDGWAY, PA. AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.

DISTRICT OFFICES IN PRINCIPAL CITIES

The heart of the "cat" cracker



Dow distribution

keeps your production steady!

Dow caustic soda deliveries are set up with an eye on *your* production schedules.

For this reason, Dow maintains an outstanding network of distribution. Dow has caustic soda plants in Michigan, Texas and California. Besides shipping from these plants, Dow distributes Caustic Soda Solution from bulk tank terminals in Carteret, New Jersey and Charleston, South Carolina. Dow also distributes Caustic Soda Solid, Flake and Ground Flake from Chicago, Illinois, Port Newark, New Jersey and Charleston, South Carolina.

Dow's distribution facilities offer you constantly dependable deliveries to assure maintenance of *your* production schedules. Take advantage of them.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Atlanta • Cleveland • Detroit • Chicago • St. Louis • Houston
San Francisco • Los Angeles • Seattle

Dow Chemical of Canada, Limited, Toronto, Canada

wherever you are... you're close to

DOW CAUSTIC SODA

DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE

WIRE ROPE

For rotary drilling lines Roebling Preformed with I.W.R.C. has extra working life

FOR EASY HANDLING, extra toughness and service life, there's nothing like Roebling Preformed "Blue Center" Steel Wire Rope. "Blue Center" steel—made only by Roebling—gives rope top resistance to abrasion and fatigue. And Roebling Preforming gives you a rope that spools better... doesn't tend to set or kink... minimizes vibration and whipping.

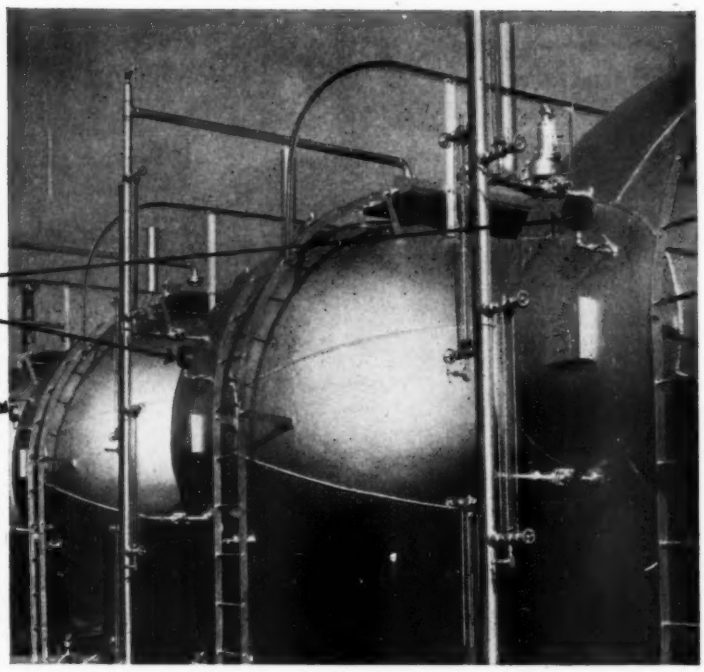
There is a Roebling wire rope of the right construction, grade and size for every type and make of rope-rigged equipment. Have your Roebling Field man help choose the rope that will give you the best and the lowest-cost performance. Still further savings may be effected by following his suggestions about the proper installation, use and maintenance of wire rope. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

DISTRIBUTED BY THE NATIONAL SUPPLY COMPANY
REPUBLIC SUPPLY COMPANY

DURAGAUGE SPECIFIED!

Ashcroft Duragauges installed on spherical propane storage tanks at Carthage, Texas.



DURAGAUGE *Nylon Movement** OUTWEARS ALL OTHERS!

How to increase *wear resistance* in a pressure gauge was a stubborn problem–until Ashcroft engineers solved it. Now *only* the Duragauge has a Nylon Movement, *the movement that outwore all others* in extensive laboratory and field tests on the worst services to be found.

Ashcroft engineers recognized the value of lightness and the other characteristics of nylon and anodized aluminum and designed these materials into precision mating parts for the Duragauge. Result: low friction, high impact absorption, corrosion resistance and freedom from objectionable products of wear. Furthermore, the nylon pinion gear and bearings retain their precise form and shape under high temperatures. Consequently, the Nylon Movement provides greatly improved indication sensitivity and accuracy and longer life.

The Ashcroft Duragauge, with Nylon Movement, has proved its enduring dependability in new and old refineries, chemical plants and power stations. It is the unqualified standard for the most "killing" services.

Your Ashcroft Distributor will gladly give you complete facts about the Duragauge and how it can solve your pressure indicating problem.

*Pat. Applied for

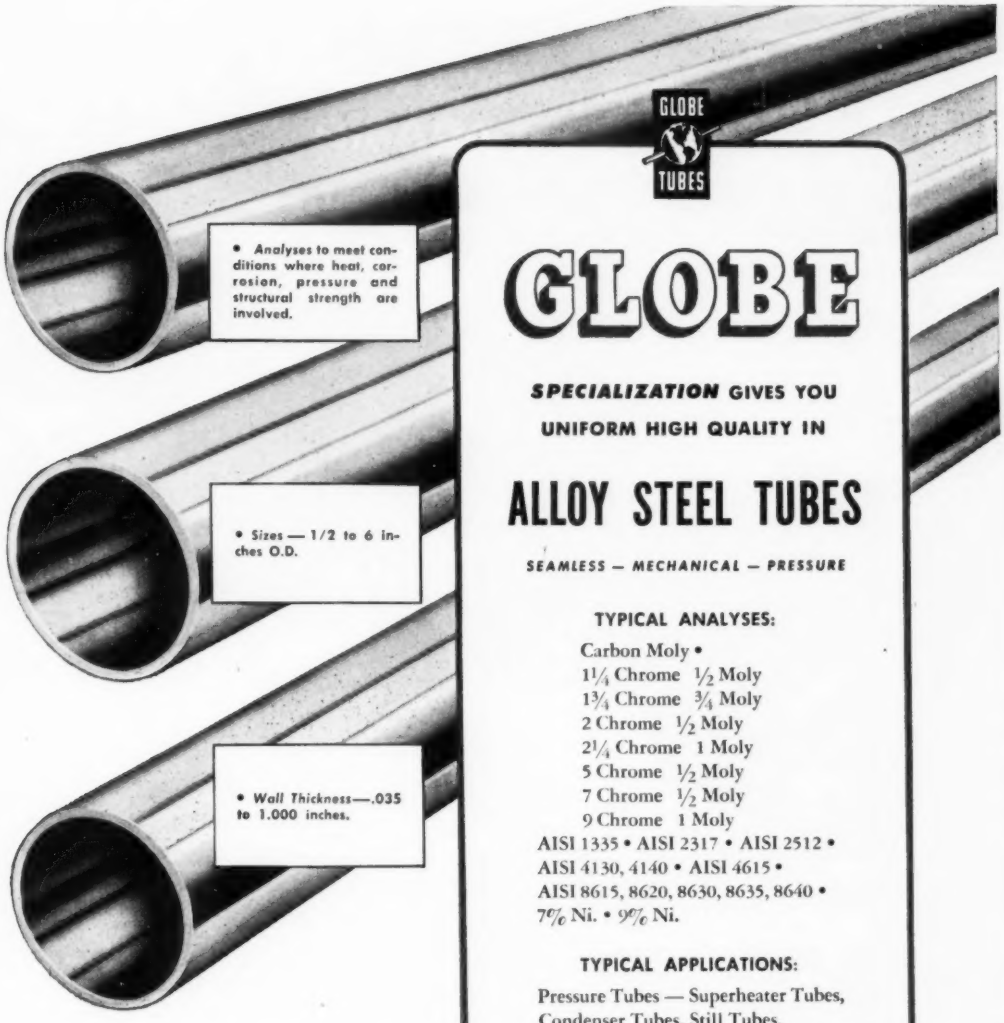
ASHCROFT 1850 U.S.A.

ASHCROFT GAUGES

MAXWELL MANNING MOORE MM TRADE MARK

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'ASHCROFT' GAUGES, 'HANCOCK' VALVES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL AND 'MICROSEN' ELECTRICAL INSTRUMENTS. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.


• Analyses to meet conditions where heat, corrosion, pressure and structural strength are involved.
• Sizes — 1/2 to 6 inches O.D.
• Wall Thickness—.035 to 1.000 inches.

GLOBE TUBES

GLOBE

SPECIALIZATION GIVES YOU UNIFORM HIGH QUALITY IN

ALLOY STEEL TUBES

SEAMLESS — MECHANICAL — PRESSURE

TYPICAL ANALYSES:

Carbon Moly •
1¼ Chrome ½ Moly
1¾ Chrome ¾ Moly
2 Chrome ½ Moly
2¼ Chrome 1 Moly
5 Chrome ½ Moly
7 Chrome ½ Moly
9 Chrome 1 Moly
AISI 1335 • AISI 2317 • AISI 2512 • AISI 4130, 4140 • AISI 4615 • AISI 8615, 8620, 8630, 8635, 8640 • 7% Ni. • 9% Ni.

TYPICAL APPLICATIONS:

Pressure Tubes — Superheater Tubes, Condenser Tubes, Still Tubes, Evaporator Tubes • Barrel Tubes • Oil-Well Pump Barrels • Mechanical Tubes • Aircraft Tubes • Propeller Tubes • Rollers for Transmission Chains

Globe engineers gladly give you the benefit of specialized knowledge and experience on the application of steel tubing in a wide range of services — mechanical — pressure — corrosion resistant.

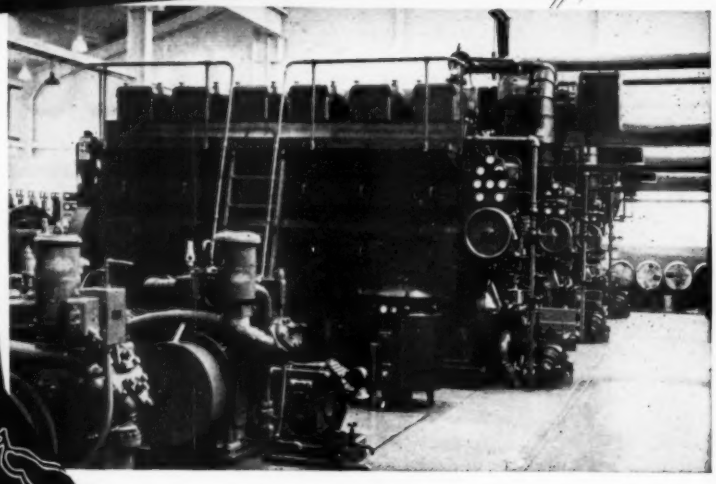
When you specify Globe, you are sure of uniform high quality alloy steel tubes — the product of highly developed production facilities and specialized quality controls. Globe Tubes are thoroughly inspected and closely held within tolerance specifications. Write for the Globe general catalog.

Globe Steel Tubes Co., Milwaukee 46, Wis.
Chicago • Cleveland • Detroit • New York • Philadelphia St. Louis • Houston • Denver • San Francisco • Glendale, Cal.

Producers of Globe seamless stainless steel tubes — Gloweld welded stainless steel tubes — alloy — carbon — seamless steel tubes — Globeiron (high-purity ingot iron) seamless tubes — Globe Welding Fittings.

How "TAPLINE" is powered to bring oil across SAUDI ARABIA

Some of the 40 Worthington Supercharged Diesels installed at five stations along Tapline, operated by the Trans-Arabian Pipeline Co. Other Worthington equipment on this project includes centrifugal refrigeration compressors for air conditioning.



Worthington Diesel Engines Selected In The Largest Single Peacetime Diesel Contract Ever Awarded

Worthington Diesels were the choice for "Tapline", the huge, recently completed engineering project that is carrying oil from the oil-rich Persian Gulf area across the Saudi Arabian Desert to the Mediterranean — bringing a vital commodity 3,500 miles and 10 days nearer to European markets.

Fueled by crude oil bled from the line, 40 Worthington Diesels, at five stations along the 1068-mile system, are an unfailing source of economical, trouble-free power. Their services include pumping oil through the line (over 13 million gallons daily), generating power for 10 centrifugal compressors used for air conditioning the maintenance quarters, for pumping tremendous quantities of water needed at each station, and for lighting the communities at the stations — each of which has electrical requirements equal to an American town of 7,000 population.

Everywhere In The World . . .

Worthington Diesels on pipeline duty and in many other services are proving that this company's pioneering in Diesel building and development pays off in better, lower-cost engine performance. For further facts proving *there's more worth in Worthington*, write to *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, N. Y.*

SEE OUR CATALOG IN THE COMPOSITE CATALOG

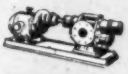
WORTHINGTON

YOUR PARTNER IN POWER PROGRESS

WORTHINGTON-BUILT AUXILIARIES

Diesel engines, 150 to 3,520 hp . . . gas engines, 175 to 3,520 hp...dual fuel engines, 225 to 3,290 hp.

Balanced Angle Compressors



Oil Transfer Pumps

Cooling Water Circulating Pumps

Evaporative Type Engine Water Cooler

PB PIPE WIPERS

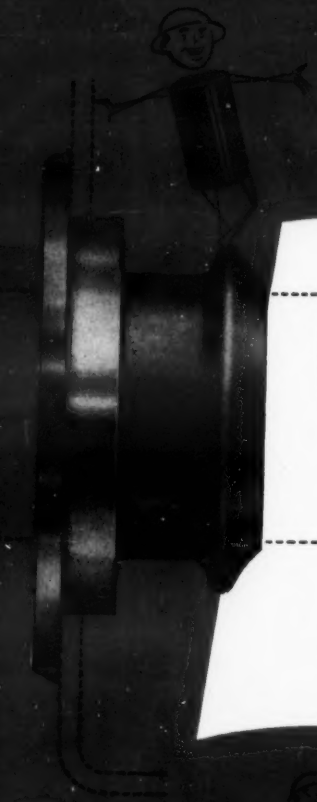
made in Tandem, Standard Single and Window types for better wiping efficiency and lower wiping costs on any rig. *Ask your PB man!*

PB SUCKER ROD PROTECTORS

Protect both rods and tubing against wear, minimize the friction load, greatly improve pump efficiency, cut power costs. *Get all the facts today!*

PB WIRE LINE GUIDES

Reduce fast sheave and wire line wear by absorbing whip and lash in the wire line. For big rigs with big lines, order the Roliguide... for all ordinary work, get Rollette!



simplify mud tank installation... speed up mud line connection...

with **PB FLEXLINE MUD TANK CONNECTORS**

YOU NEED ONLY *plain end pipe* for connecting tanks... run your pump suction to a Flexline Connector in your tank and the Connector absorbs the pulsation. Pipe can extend as far as necessary into tank, eliminating need for accurate "spotting." Extreme flexibility allows as much as 10° misalignment without leakage. Pump pulsations and vibration are absorbed...tank or pump setting are compensated. Installation of Flexline on your mud tanks is quick, simple, inexpensive. *For complete details, consult your PB Representative listed below!*

P protection is our B business...!

PB OIL FIELD SPECIALTIES

Patterson-Ballagh

Division of Byron Jackson Co.

MAIN OFFICE: 1900 EAST 65TH STREET

LOS ANGELES 1, CALIFORNIA

PB SERVICE BRANCHES

PATTERSON-BALLAGH PATTERSON-BALLAGH PATTERSON-BALLAGH

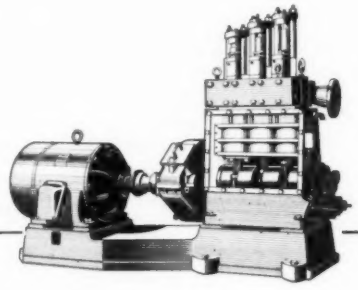
PATTERSON-BALLAGH PATTERSON-BALLAGH PATTERSON-BALLAGH

more horse-power per pound

Famous for stamina and a sure foot, the burro was a hard-working "pardner" of the old-time prospector. He's a little fellow—but he packs more horse-power per pound than any of his four-footed cousins . . .

This ability to get more work done with fewer pounds to do it is precisely what Aldrich Direct Flow Pumps have to offer. As a result of improved design, weight of the fluid-end is considerably reduced. And—whereas a speed of 150 rpm was formerly considered high for reciprocating pumps—these compact, Direct Flow units are operating today at speeds of 500 rpm for the 3″; 360 rpm for the 5″; and 300 rpm for the 6″ stroke. In each case, you get greater volume and higher pressure from a smaller pump: *you get more horse-power per pound.*

Applications where you'll find Aldrich Direct Flow Pumps putting in time and over-time include: water flooding, salt water disposal, pumping lean oil to absorbers, and the handling of diethylene glycol, gasoline, propane, butane. Request Data Sheets 64, 64-B for complete information.



THE ALDRICH PUMP COMPANY

9 GORDON STREET • ALLENTOWN, PENNSYLVANIA

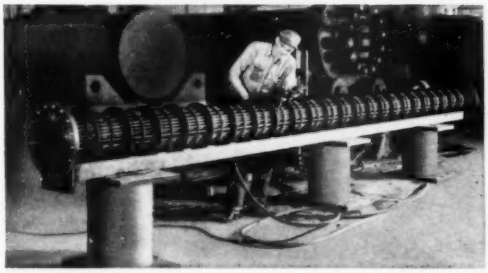
...Originators of the Direct Flow Pump

Representatives: P. H. Arden, P. O. Box 185, Glenview, Ill. • Bushnell Controls & Equipment Co., 3929 W. Jefferson Blvd., Los Angeles 16, Calif. • L. T. Gibbs, 509 Petroleum Bldg., Tulsa 3, Okla. • R. B. Moore Supply Co., Inc., Bolivar, N. Y. • Power Specialty Co., 2000 Kipling St., Houston 6, Texas • Reeves & Skinner Machinery Co., 2211 Olive St., St. Louis 3, Mo. Stearns-Roger Manufacturing Co., 1720 California St., Denver 2, Colo. • Export Sales: Petroleum Machinery Corp., 30 Rockefeller Plaza, New York 20, N. Y. • Birmingham • Boston Buffalo • Cincinnati • Cleveland • Detroit • Duluth • Jacksonville • Omaha • Philadelphia • Pittsburgh • Portland, Ore. • Richmond, Va. • San Francisco • Seattle • Spokane, Wash. • Syracuse

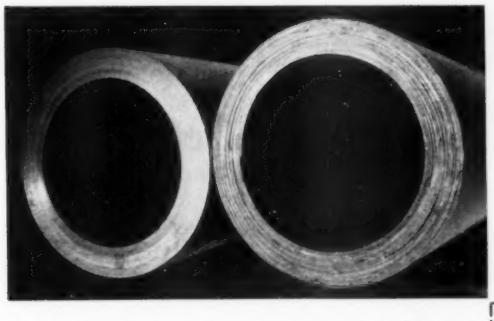
A.O.Smith Multi-Layer Heat Exchangers

MULTI-LAYER Heat Exchanger for an ammonia plant. The shell, designed for 5150 psi working pressure, is 23 inches and 13¾ inches in diameter with wall thickness of 4¾ inches and 3 inches, respectively.

Meet the Challenge of High Pressure Specifications



Heat Exchanger tube bundle for the above is designed to take advantage of low differential operating conditions within an exchanger designed for 5150 psi chemical process.



Remarkable flexibility of design and manufacture makes A. O. Smith MULTI-LAYER Heat Exchangers adaptable to a wide range of high-pressure services.

MULTI-LAYER Heat Exchanger shells are built up from concentric layers of relatively thin steel plate progressively wrapped, tightened and welded together around an inner pressure-tight cylinder.

Wrapping tension and weld shrinkage develop desirable compression in the inner layers of the shell during manufacture. This results in more equalized loading of all portions of the heat exchanger wall under working pressure. Thus, the full calculated strength of the steel is more completely utilized.

Where corrosion is a problem, only the inner shell need be made of corrosion-resistant materials. The load-bearing portion of the vessel wall—since it is not in contact with corrodents—can be manufactured of more economical and readily weldable steel plate.

This feature, alone, frequently effects substantial savings over the cost of solid alloy construction and is especially advantageous during the current restrictions on use of certain alloy materials.

Call upon A. O. Smith for assistance on your heat exchanger problems. Write the nearest office or use the handy coupon.

End view of a MULTI-LAYER Heat Exchanger shell course showing how the wall is built up from concentric layers of thin steel plate. To the right: end view after wrapping is completed. To the left: end has been machined and scarfed, ready for welding to the next shell course or end closure.

A.O.Smith

VESSELS • HEAT EXCHANGERS

77th ANNIVERSARY

Boston 16 • Chicago 4 • Cleveland 15 • Dallas 2 • Denver 2
Houston 2 • Los Angeles 22 • Midland 5, Texas • New Orleans
New York 17 • Philadelphia 3 • Pittsburgh 19 • San Francisco 4
Seattle 1 • Tulsa 3 • Washington 6, D.C.
International Division: Box 2023, Milwaukee 1

A. O. Smith Corporation
Dept. OG-651, Milwaukee 1, Wis.

Without obligation, send me bulletins and information on your MULTI-LAYER Heat Exchangers and their construction features.

Name_____

Address_____

Firm_____

City_____

January 18, 1907 OIL INVESTOR'S JOURNAL

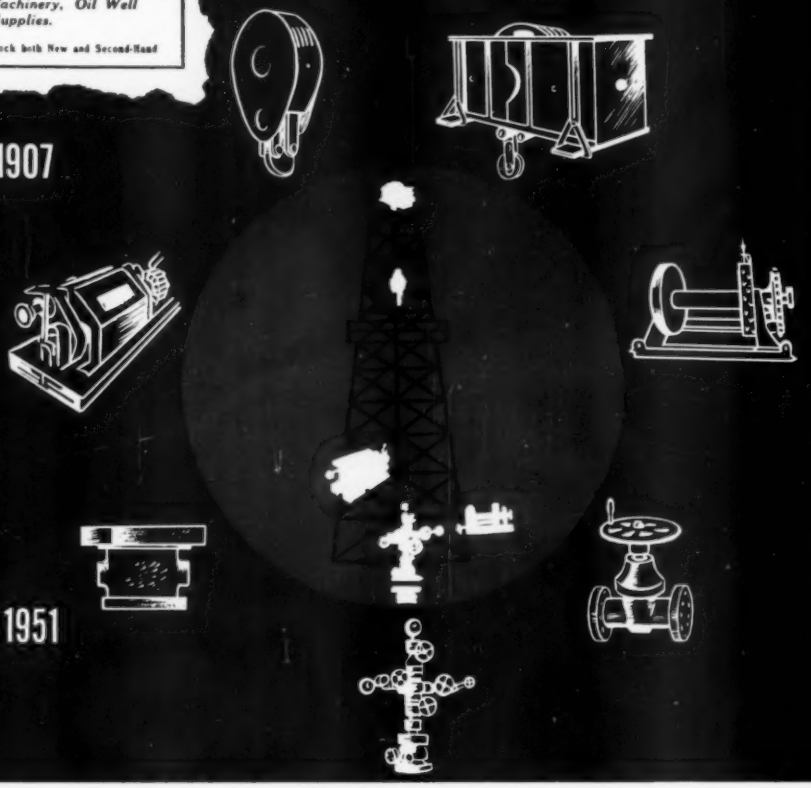
BEAUMONT IRON WORKS, INC.

BEAUMONT, TEXAS

Manufacturers of Complete Rotary Drilling Rigs. Standard Rig Irons, Oil Well Machinery, Oil Well and Pipe Line Supplies.

We carry Boilers, Engines and Pumps in Stock both New and Second-Hand

PRODUCING IN 1907



. . . . PRODUCING IN 1951

BIW Rotary Drilling & Production Equipment *for fast, low-cost operation*

Today—enriched by nearly a half century of experience—BIW continues to produce a wide variety of equipment including drawworks, crown and traveling blocks, wellhead assemblies, coring reels and other equipment of high quality design and fabrication.

A specialty product is the Atlas-Hughes non-lubricated valve for Christmas tree and other oilfield uses. For information on all BIW drilling and production equipment, get in touch with your nearest Atlas Engineering Works representative.

exclusive sales agents

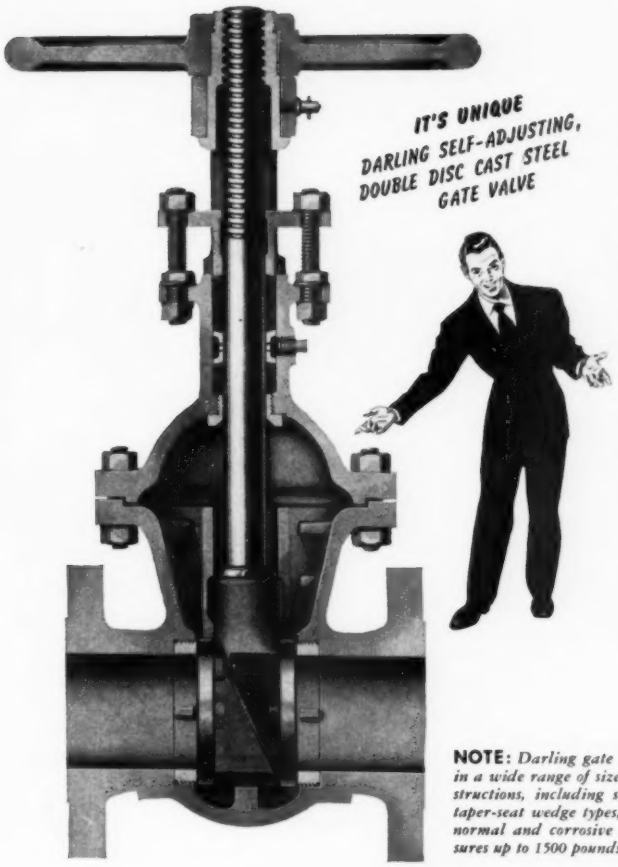
ATLAS ENGINEERING WORKS

Houston and Beaumont, Texas

BEAUMONT IRON WORKS COMPANY

Subsidiary, American Locomotive Company

WHY seat misalignment doesn't cause this Darling Valve to leak!



NO gate valve body ever made is entirely immune to distortion caused by line stresses and temperature changes. Yet even slight distortion can throw the seats out of alignment—probably the most common cause of leaky valves and costly replacement.

That's one reason why Darling gate valves, with their unique wedging principle combined with fully revolving double discs and parallel seats, have the jump on other valves. They easily, *automatically* adjust for valve body distortion, cinching tight, leak-proof closure without destructive strong-arm tactics. Most important, you avoid costly down-time and repeated maintenance headaches.

But that's not all! Actually, this Darling principle offers several other equally important time-and-money-saving advantages. In plant after plant they add up to trouble-free performance and longer service life with a very minimum of attention.

GET ALL THE FACTS

Send for descriptive cast steel valve Bulletin No. 5003.

DARLING VALVE & Manufacturing Co.
WILLIAMSPORT 1, PA.

NOTE: *Darling gate valves are made in a wide range of sizes, types and constructions, including solid and slotted taper-seat wedge types, for all kinds of normal and corrosive services in pressures up to 1500 pounds.*

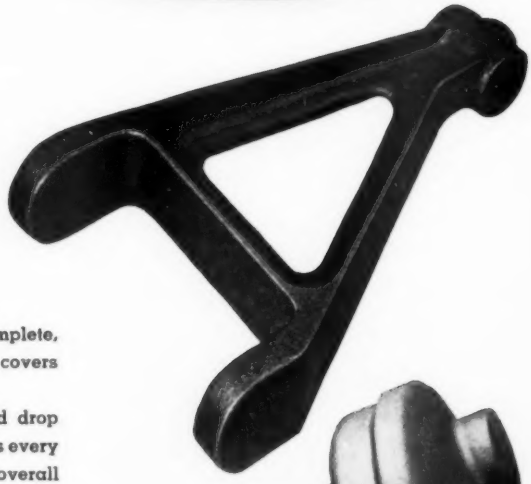
DARLING

VALVES

FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN

AT BETHLEHEM...

The Complete DROP-FORGING SERVICE



At Bethlehem there are all the advantages of a complete, integrated drop-forging service—a service that covers everything throughout all stages of processing.

Our shop equipment includes steam and board drop hammers, mechanical presses, and upsetters . . . plus every facility for heat-treating forgings as required. An overall check of each job is provided by Bethlehem metallurgists, who are in constant touch with steel-melting operations, forging and treating practices, and all other points that influence quality.

Bethlehem closed-die forgings are made of carbon or alloy steel in weights ranging from 1½ to 250 lb. For years we have produced an enormous variety of designs used in widely different fields—petroleum, mining, automotive, electrical, aviation, and numerous others. This is a type of experience that has helped untangle many a tough forging problem brought in by our customers.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

Choose ability to do more jobs faster, Choose an FWD 6x6 for oil field work

"That big FWD is sure a 'bear' for work — on or off the road. Power to spare — handles like a kitten under any load."

"I'm convinced an FWD 6x6 is tailor-made for our kind of job — heavy hauling, bulky awkward loads — tough cross-country traveling."

That's typical oil-man talk about FWD's. The reasons for it are simple. There's added traction and safety with 6x6 drive and balanced distribution of weight and power — specifically engineered for smooth and rough going on hard surface or soft bottom. They all add up to one thing — continuous outstanding performance over longer truck life. Get the complete FWD 6x6 story — 30,000 lbs. to 60,000 lbs. GVW — an oil-man's truck for oil-man's work.

THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis. • Canadian Factory — Kitchener, Ontario

World-Wide Sales and Service

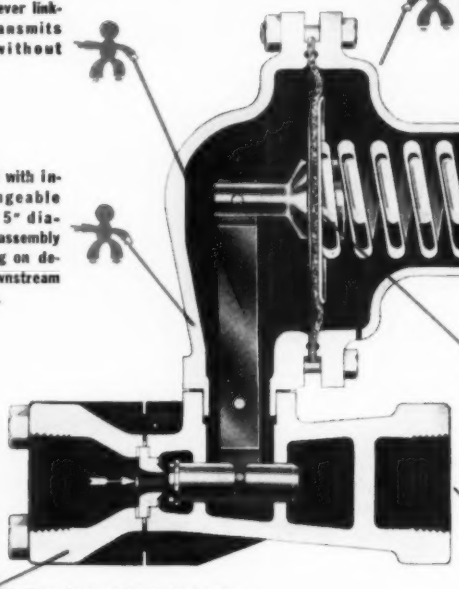
America's Foremost Heavy-Duty Truck

Sturdy lever linkage transmits force without strain.

Heavy-duty construction defies rugged field conditions. Compact design simplifies installation and conserves space.

Simple pressure adjustment over wide range.

Provided with interchangeable 2½" or 5" diaphragm assembly depending on desired downstream pressure.



Large diameter carefully calibrated spring provides stable control.

Extra strong, extra flexible diaphragm guarantees safe, positive control.

Available with either 1" or 2" inlet and outlet connections.

Forged steel inlet adaptor for all pressures up to 1000 pounds.

FISHER®

Big Joe

FIELD REGULATOR TYPE 630

Controlled expansion reduces freezing to a minimum.

Removable disc holder assembly. Disc of synthetic rubber or special Teflon as required.

Removable orifice available in all required sizes and materials.

Streamlined travel ways eliminate reverse flow and increase capacity.

The famous Fisher "Big Joe", which enjoys a universal reputation for complete dependability, is the first choice for pounds to pounds service. Inlet pressures up to 1000 lbs. Reduced pressures 5 to 200 lbs.

Write for Catalog P-10

FISHER LEADS THE INDUSTRY IN RESEARCH FOR BETTER GAS PRESSURE CONTROL

FISHER GOVERNOR COMPANY

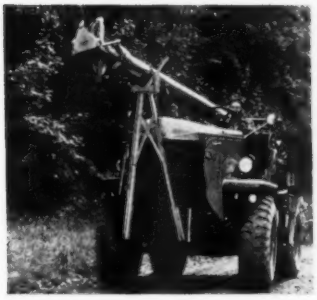
Marshalltown, Iowa

Non-Stop Transportation to any destination!

— regardless of mud, sand, soft dirt, snow or steep grades

New WALTER OILFIELD TRACTOR

for Servicing, Drilling or Exploratory Equipment

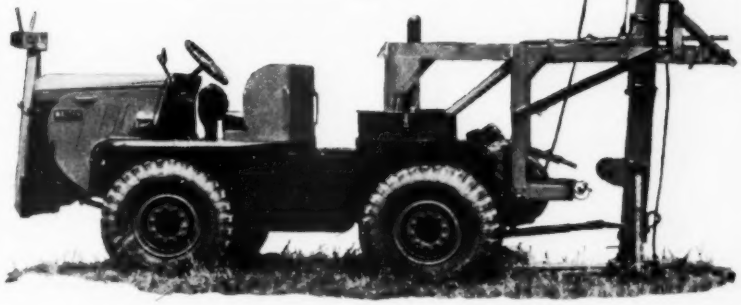


WITH its great power and 100% non-slip traction, the Walter Oilfield Tractor "makes its own roads" to reach locations now impossible with wheeled vehicles. Its big feature—found in no other truck—is the Walter Four-Point Positive Drive which automatically proportions torque to each of the four driving wheels according to its traction at any moment. There are never spinning wheels to bog down in difficult terrain. Learn how this rugged, compact tractor can speed up and expand your well-to-well servicing. See the nearest distributor below—or write us for further details. Walter Motor Truck Co., 1001-19 Irving Ave., Ridgewood 27, Queens, L.I., N.Y.

OTHER FEATURES:

- 30-40 m.p.h. on normal roadways
- 125 hp. 6 cylinder heavy duty motor
- 90 inch wheel base permits 18 ft. turning radius
- 16 inch ground clearance
- Large, single 14:00 x 20 tires
- 12,000 lb. drawbar pull at 3 m.p.h.
- 6 speeds forward, 2 reverse
- 16,000 lb. total gross weight

Other models up to 36,000 lb. g.v.w.



WALTER
4-POINT POSITIVE DRIVE
TRACTOR TRUCKS

See your nearest distributor

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J. F. Brittain
3001 Glenwood Park Ave., Erie, Pa.
Clyde W. Beckner, Inc.
219 Virginia St., W., Charleston, W. Va.
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1820 Elmwood Ave., Syracuse, N. Y.

MONT., WYO., NEW MEXICO
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TEXAS
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Edward R. Bacon Co.
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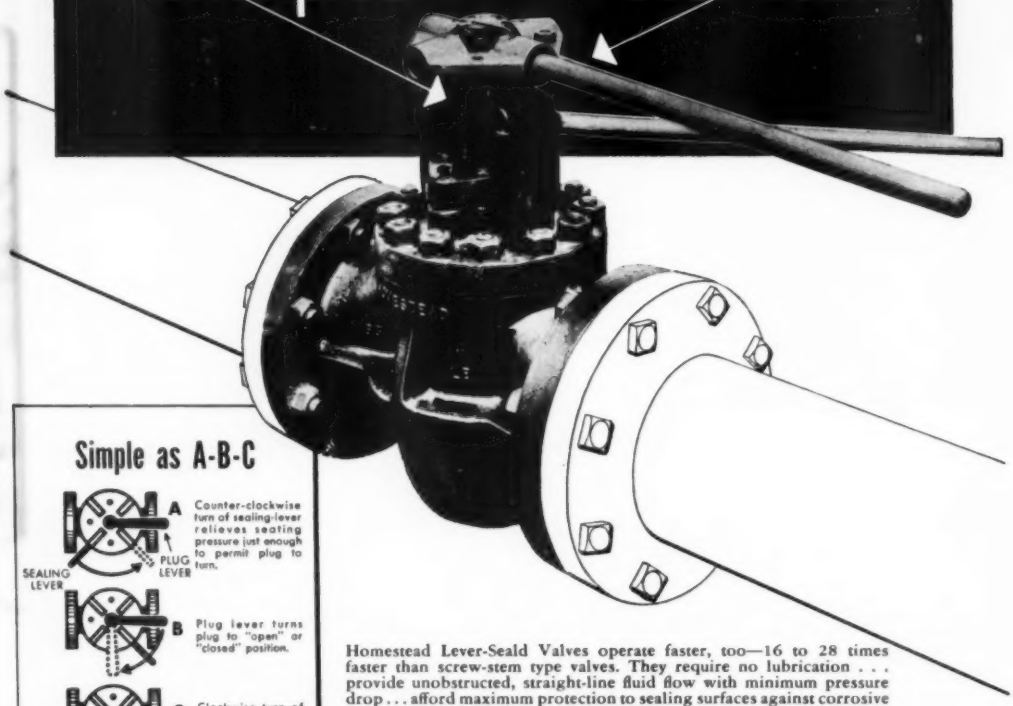
LOUISIANA and MISSISSIPPI
Logan Perkins
Int'l Trade Mart, New Orleans, La.

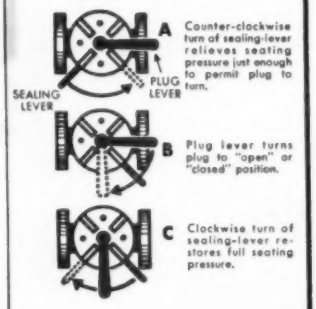
- at all times
- under all conditions
- throughout its long lifetime of service

This Homestead Valve will always work

it's **stickproof** because it's **lever-seald**



Simple as A-B-C


A
Counter-clockwise turn of sealing-lever relieves seating pressure just enough to permit plug to turn.
SEALING LEVER
PLUG LEVER
B
Plug lever turns plug to "open" or "closed" position.
C
Clockwise turn of sealing-lever restores full seating pressure.

Homestead Lever-Seald Valves operate faster, too—16 to 28 times faster than screw-stem type valves. They require no lubrication . . . provide unobstructed, straight-line fluid flow with minimum pressure drop . . . afford maximum protection to sealing surfaces against corrosive and erosive line fluids. And because only a quarter-turn is needed for full opening or closing, they are ideal for installation in restricted areas where operation of other types of valves might be difficult.

Next time you have damaged or sticking valves, replace them with Homestead Lever-Seald Plug Valves. Once you use them you'll never be satisfied with ordinary valves.

For complete information write for Valve Reference Book No. 39-3.

HOMESTEAD LEVER-SEALD PLUG VALVES

HOMESTEAD VALVE MANUFACTURING COMPANY

Serving since 1892

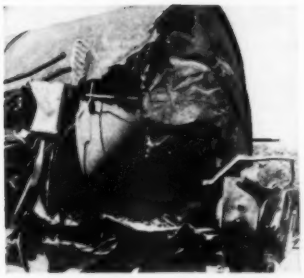
P.O. BOX 403 CORAOPOLIS, PA.

Re-orders
speak louder than words

Take the case of Warren Petroleum Corp.

Warren started using A.C.F. Tank Cars back in 1929. The first order was for 100 cars. For 6 years, the orders stayed small: 10 cars... 20 cars... 15 cars. Then, as these A.C.F. Tank Cars began to set impressive service records, the orders swelled: 100 cars ...357 cars...*600 cars!* At this writing, Warren has backed A.C.F. Tank Car quality with orders for *over 2,500 cars!*

All-Welded Cars Now Standard



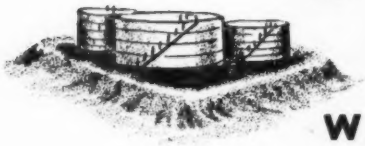
An example of what A.C.F. All-Welded construction can mean to a shipper. This fully-loaded car received a severe bump on the circumferential end seam. Although the seam was deeply dented, the shell remained intact!

Over 1,000 of Warren Petroleum's tank cars have been of the *all-welded, X-Ray-tested* class. Operating records show these A.C.F. cars safer to run... less costly to maintain. Read about the amazing assembly-line construction techniques that make these savings possible. Write for information: American Car and Foundry Company, 30 Church Street, New York, N.Y. Other Sales Offices: Chicago • St. Louis • Cleveland Washington • Philadelphia • San Francisco

a.c.f.

ALL-WELDED TANK CARS

for Safe Delivery—



SAFETY FIRST
SAFETY FAST

With A Bucyrus-Erie Bulldozer on Fire Control

ALERT to the ever-present threat of fire, safety-minded oil field operators utilize the latest and best fire prevention and control methods.

That's why fast-working, Bucyrus-Erie Bulldozers and Bullgraders fill an important spot as safety patrol units. Matched to powerful International crawler tractors, these hard-hitting front ends build fire walls around storage tanks, dig trenches, clean up brush, punch out emergency roads — move dirt where it's needed when it's needed.

Fast blade work is easy . . . a single lever handles all four blade positions — raise, hold, lower, float.

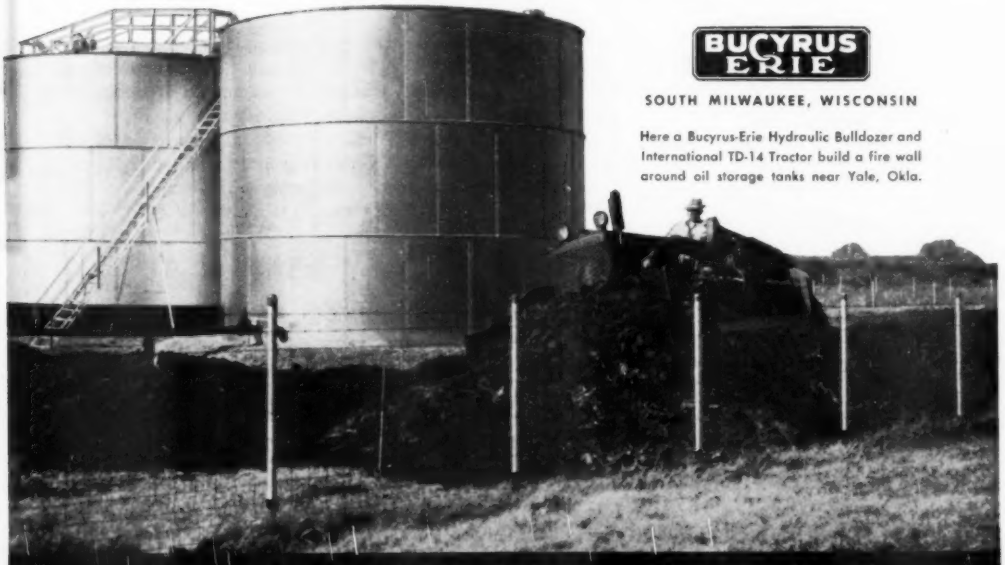
And one man can make Bullgrader angle and tilt adjustments in a few minutes without special tools. Another speed-up feature is the scientifically curved blade. It doesn't just push — it *rolls* dirt along — the fastest, cheapest, easiest way to move a load.

Fire control is just one of the many oil field jobs tailor-made for Bucyrus-Erie hydraulic and cable Bulldozers and Bullgraders. Your International Industrial Tractor Distributor can give you full details. 271TS1

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

Here a Bucyrus-Erie Hydraulic Bulldozer and International TD-14 Tractor build a fire wall around oil storage tanks near Yale, Okla.



See Your INTERNATIONAL Industrial Tractor Distributor

BUILT FOR INDUSTRIAL POWER NEEDS EVERYWHERE!

Day-in, day-out! . . . developing maximum horsepower with a minimum of down time and at minimum operating cost! That's the outstanding record of Chrysler Industrial Engines on the job!

For Chrysler Industrial Engines are built *solely for industrial use!* They are designed and engineered to meet the *specific working requirements* of each type of equipment they power. Chrysler Industrial Engines can also be adapted to special regional operating conditions.

A letter of inquiry will bring an engineer well qualified to discuss your particular application. Address: **Industrial Engine Division, Chrysler Corporation, Detroit 31, Mich.**

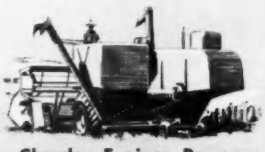
CONSTRUCTION

Chrysler Engines Power: Ditching Machines • Cranes • Truck Mixers • Shovels • Loaders • Yarders • Road Pavers • Concrete Mixers • Crane Carriers • Scoop Tractors

INDUSTRY

Chrysler Engines Power: Air Compressors • Pumps • Hoists • Derricks • Tractors • Generators • Arc Welders • Baling Machines • Winches • Conveyors • Tackle Blocks

FARMING



Chrysler Engines Power: Tractors • Combines • Hay Choppers • Gang Mowers • Spreaders • Pumps • Feed Mills • Irrigation Equipment • Orchard Sprayers • Sprinklers

OTHER FIELDS

Chrysler Engines Power: Locomotives • Fire Pumps • Motor Coaches • Drilling Equipment • Pulp Machines • Snow Plows • Oil Well Pumps and Drillers • Street Flushers • Air Conditioning Equipment

IT TAKES *TEAMWORK!*

..to land a marlin...and to assure *efficient* slush pump operation

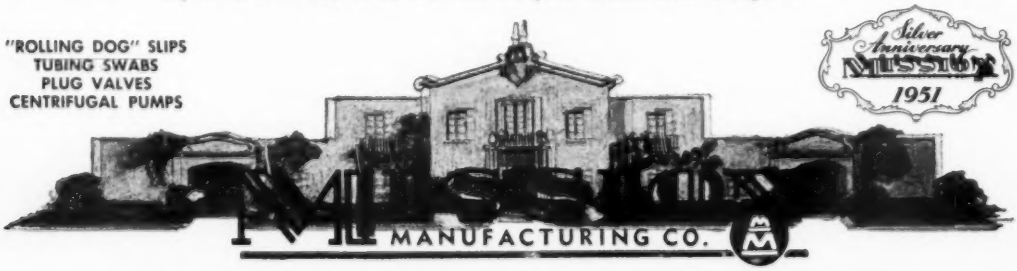
Mission Silver Tip Valve for Normal Pressures

A 400-pound marlin is tough to handle . . . but expert teamwork will do it! Teamwork of precision parts is also what it takes to assure **efficient** slush pump operation. Piston, rod, liner, and packing must be in perfect alignment . . . must be a perfectly matched, precision team! Valves must be **equally** efficient and reliable.

The MISSION "Super Service" Liner rounded out the famous MISSION team of expendable slush pump parts. It is accurately bored, **induction** hardened to **uniform** case thickness, precision honed, and "Satin Finished". These MISSION parts constitute a perfectly mated **team**, **unbeatable** for reliability, efficiency, economy. Your supply store handles them . . . Mission Manufacturing Co., Houston, Texas. Export: 30 Rockefeller Plaza, New York. European Address: London, England.

Mission Super-Service Valve for High Pressures

"ROLLING DOG" SLIPS
TUBING SWABS
PLUG VALVES
CENTRIFUGAL PUMPS



Silver Anniversary MISSION 1951

They Say—

Bouquet to Oil

"I believe that your Association would profit from studying the educational program undertaken by the oil industry through the Oil Industry Information Committee of the American Petroleum Institute.

"A recent national public opinion survey, conducted by Junior Achievement—a national youth organization—showed that 65 per cent of all teenage boys and girls in this country are in favor of government operation of all United States business. If this survey is an accurate expression of teen-age sentiment toward our private enterprise system, an alarming situation is presented.

"Those of us engaged in private enterprise . . . have a duty to be aware of and try to improve our public relations and the best way to do that is to render the best possible service to the public."

Marlin M. Volz, dean of the school of law, University of Kansas City addressing National Association of Insurance Adjusters, Dallas.

Where Next?

"Nationalization, like some forms of virus, is catching. And it is not only Iran's neighbors and not only oil properties that may provide the incubators."

Editorial in the New York Journal of Commerce.

Growing Dollar

"The fact is while the average 1951 dollar has been trimmed to something like 60 cents in terms of 1925 buying power, today's gasoline dollar has actually risen in value because it buys the same volume, plus a great deal more performance than it did in 1925. In the meanwhile, gasoline taxes have gone up over 200 per cent and now add from one-quarter to one-third and more to the price."

The Bulletin, Standard Oil Co. of California.

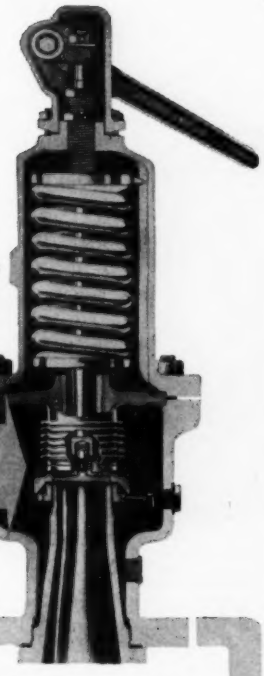
Holman on Iran

"We certainly do not believe in the breaking of contracts by one party acting solely by itself, nor in the confiscation of property.

"Business, both domestic and international — and not only business but most of the basic relationships among civilized people—rest on the principles of respect for property rights and the sanctity of contracts.

"If these principles can be unilaterally violated, the international investment and trade which is required for the economic well-being of the peo-

meet the newest member of the *FarriSeal* family



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IT SAVED $75,000 IN PIPING WITH A $5,000 VALVE INVESTMENT**

Pioneered by Farris Engineering Corp., embodying advanced engineering technics, *and absolutely unique*—although it is now being imitated—the patented BalanSeal is ideally suited for use wherever a collecting system is required for a series of safety-relief valves. It permits a higher downstream pressure—and consequently, smaller piping. Yes! The cost of a BalanSeal valve installation is a mere fraction of the savings effected in down-stream piping. (**In one case, a cost reduction of $75,000 resulted from a $5,000 investment in BalanSeal Valves.)

In BalanSeal, the sole force opposing the opening of the valve is the spring. Downstream back pressure, static or surge, cannot act on the disc and has absolutely no effect on the relieving point.

BalanSeal is the ultimate in safety-relief valve design and construction. The bellows, which also distinguishes the FarriSeal design, is so proportioned as to eliminate any unbalanced forces on the valve disc—which is perfectly balanced on its seat at the set pressure. Like all other FarriSeal Valves, perfect protection is provided for guide, stem and spring by completely isolating these parts from the lading fluid.

Get the facts on the revolutionary BalanSeal Safety Relief Valve. Find out how you can cut installation costs to the bone, step up operating profits. Write for Bulletin No. 52B—it will pay off in ASSURED safety and installation economy.

*Patented and Patents Pending

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Process Pump Output -over 20,000 H.P.

BIGGEST PROCESS PUMP INSTALLATION EVER DESIGNED AND MADE IN BRITAIN

Two years ago, Shell commissioned the first distillation unit at Cardon, Venezuela and it has been on stream ever since. The process pumps operating in this distiller — along with units for thermal cracking, gas tail, high vacuum and other sections of the refinery, which went into operation shortly afterwards, were supplied by Sigmunds.

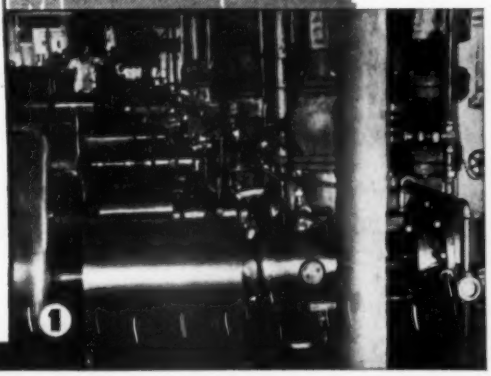
Now the second distillation unit has been put in hand, and once more Sigmund are to be responsible for the pumps. This new contract raises the total of Sigmund pumping equipment at the Cardon refinery to over 20,000 h.p., in a plant which will have an intake of crude oil in the region of 140,000 barrels a day when the additional distillation unit is completed — sufficient to provide over a third of Britain's requirements of petroleum products.

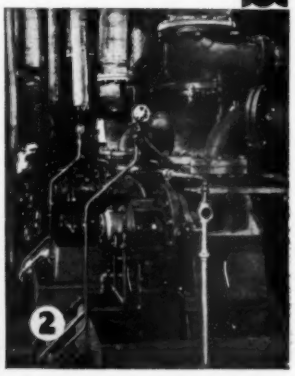
Sigmund Pumps Ltd., Terminal House, 52, Grosvenor Gardens, London, S.W.1.

The process pumps - some of them for operating temperatures of 900°F — others made in 18.8.3. stainless steel, are typical products of the Sigmund organization. Designed and engineered in one of the finest pump plants in the world, and, like all Sigmund pumps, built to give real service.

1. Group of single stage slurry pumps type HO-N in catalytic cracking unit.

2. Group of hot oil pumps of a total output of 3,000 H.P.





S.P.4

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ples of the world will not be forthcoming."

Eugene Holman, president of Standard Oil Co. (N. J.), addressing stockholders meeting in Linden, N. J.

What's a B.t.u.?

"When a customer asks: What is meant by a B.t.u. (British Thermal Unit)? an easily understood answer is this:

"It is a unit of heat measurement that represents just about the amount of heat delivered by burning a wooden safety match all the way down."

Burner Tips, Houston Natural Gas System.

Growing Petrochemicals

"The petroleum - chemical field is still rapidly expanding and its rate of growth is expected to continue for a long time. Petroleum is and will continue to be a main source for organic chemicals.

"The extent of the petroleum-chemical business in the United States can be seen from the fact that in 1925 less than six million pounds of organic chemicals were produced from petroleum. By 1950 this had increased to an estimated 14.5 billion pounds."

E. V. Murphree, president, Standard Oil Development Co., addressing Third World Petroleum Congress, The Hague.

Gas-Anchor Mice

Sirs:

Recently we received a report from one of our representatives which indicates that there may be higher forms of life in oil wells than heretofore has been suspected. You are aware, of course, that Shell engineers have proved that bacteria is eating the casing in their Ventura wells but I wonder if you have any data which would indicate how harmful mice in gas anchors may be.

We have been concerned about the problem since our representative, Burt Sheets, reported finding a live mouse in the gas anchor of a Sinclair well in the Lindsay (Okla.) pool. The parallel tubing strings had been in the well several months and were pulled for a well rework. Sheets reports that just as the gas anchor was being laid down, this mouse stuck his head out, apparently to ascertain the cause of the commotion.

The report further states that it required considerable coaxing to get the beast to abandon his bombproof home in favor of a new one in the post oaks.

There was no evidence that either the gas anchor shell or the skeeter-bill had been nibbled on but we have an uneasy feeling that nothing good could come from having mice, or even one mouse, in the gas anchor.

We have been unable to find any literature on the subject which would confirm or allay our fears. We would

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ECONOMICAL You get at least 10 to 1 expansion when you use Pyrene Foam Compound. You save on transportation and storage, too.

*T.M. Reg. U.S. Pat. Off.

FREE! Send for the Pyrene Air Foam catalog, an important reference work. It fully illustrates and describes Pyrene Air Foam equipment — America's most complete line — approved by Underwriters' Laboratories and Factory Mutuals.

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C-O-Two Fire Equipment Co.

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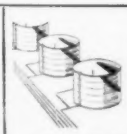
Portable; easy to carry and use. Make foam anywhere that hose and water connection are available. Four sizes, capacities 200 to 1,200 gals. foam per min.

PYRENE PROPORTIONING TANKS

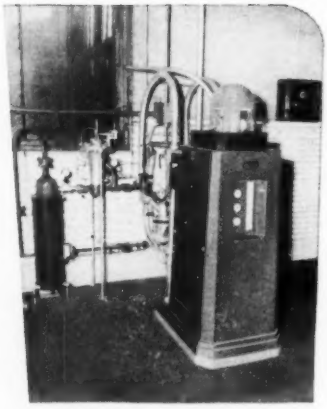
They feed foam compound into water stream. Seven types, wheeled and stationary. 40 gal. size produces 7,000 gals. of foam. Refillable.



PYRENE FOAM SYSTEMS

Six different types, to meet every need. Simple, manual one-man operation — or fully automatic. Whatever your problem, there's a Pyrene Foam System to solve it.

SAXTON'S SECRET WEAPON . . .



W&T Chlorinator Installation at Saxton Station

A W&T CHLORINATOR

In winning their battle against condenser slime at the Saxton Generating Station, Pennsylvania Electric Company, in their company publication, called the Wallace & Tiernan Chlorinator their "Secret Weapon."

Here's what happened before chlorine was tried. Experience showed even a small accumulation of slime caused a one inch loss in condenser vacuum — equivalent to a five to ten per cent reduction in plant efficiency. Frequent mechanical cleaning — expensive and disagreeable — still left a thin layer of slime. Cleaning compounds involving acids and alkalis were found an unsatisfactory answer to the problem.

Then Chlorine was tried! Preliminary tests indicated that coal consumption could be decreased by about $75 per day. *But*, feeding chlorine without special equipment proved both expensive and dangerous. A slight variation in feed rates resulted either in insufficient treatment or excessive chemical costs.

As a result of these tests, a Wallace & Tiernan Automatic Chlorinator was installed at Saxton in May 1949. This precision chlorinator made possible reduced coal consumption and virtual elimination of mechanical tube cleaning — the reasons why a W&T Chlorinator is Saxton's "Secret Weapon."

Hundreds of power plants have had benefits similar to those at the Saxton Station. Your W&T Engineer is prepared to help solve your slime problems — why not write for more information today — no obligation, of course.

CD-36

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CHLORINE AND CHEMICAL CONTROL EQUIPMENT

Belleville 9, New Jersey • Represented in Principal Cities

appreciate it if you would advise, at your earliest convenience, if you know of any published or unpublished material which could throw some light on the problem.

P. H. Jamison,
Sales Promotion Engineer,
KOBE INC.
Division of Dresser Equipment Co.

Editor's note: Henry Ralph, editor in charge of detective work, is now on vacation. This mystery will be called to his attention immediately upon his return.

CALENDAR

June

American Institute of Electrical Engineers summer general meeting, Royal York Hotel, Toronto, June 25-29.

July

Western Petroleum Refiners Association regional meeting, Broadview Hotel, Wichita, July 19-20.

Wyoming Geological Association, sixth annual field conference, Rawlins, Wyo., July 31-August 3.

August

Wyoming Geological Association, sixth annual field conference, Sinclair, Wyo., August 1-3.

Society of Automotive Engineers, Inc., West Coast meeting, Olympic Hotel, Seattle, August 13-15.

Western Petroleum Refiners Association regional meeting, Leonard Refineries Auditorium, Alma, Mich., August 17.

American Institute of Electrical Engineers, Pacific general meeting, Multnomah Hotel, Portland, Ore., August 20-23.

Eleventh Annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va., August 27-29.

September

American Chemical Society, 120th national Diamond Jubilee meeting, Hotel Statler, New York City, September 3-7.

Pacific Coast Gas Association, annual convention, Fairmont Hotel, San Francisco, September 4-6.

Michigan Petroleum Association, annual fall convention, Ramona Park Hotel, Harbor Springs, Mich., September 6-7.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, New York City, September 8-9.

New York Oil Heating Association, Inc., Hotel Statler, New York City, September 10.

International Congress of Pure and Applied Chemistry, twelfth conference, Hotel Statler, New York City, September 10-13.

Instrument Society of America, Coliseum, Houston, September 10-14.

American Society of Mechanical Engineers, Industrial Instrument and Regulators division, Coliseum, Houston, September 10-14.

National Petroleum Association, Hotel Traymore, Atlantic City, September 12-14.

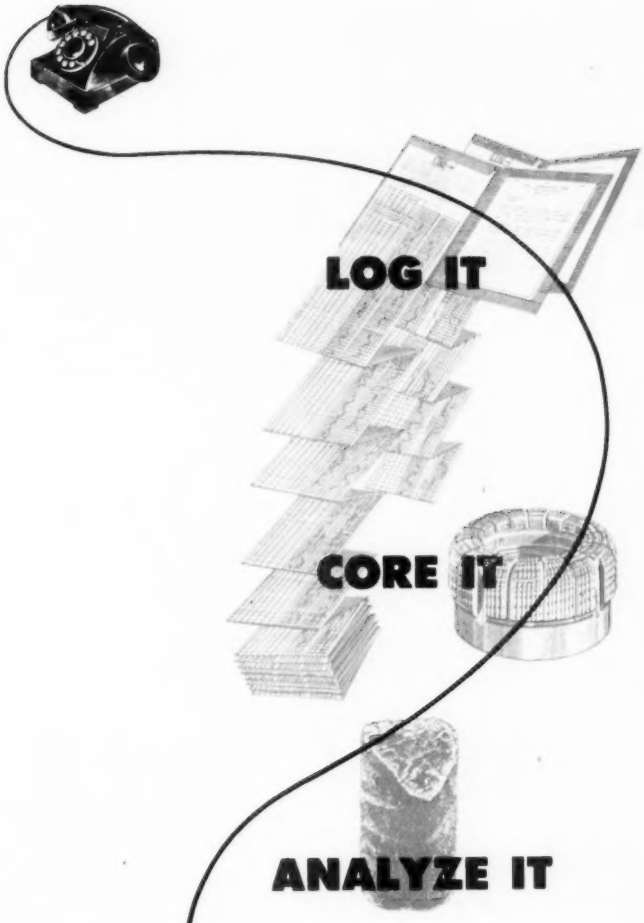
International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, Washington, D. C., September 14-15.

American Institute of Chemical Engineers, national meeting, Sheraton Hotel, Rochester, N. Y., September 17-19.

Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo., September 20-21.

American Association of Oilwell Drilling Contractors, eleventh annual meeting, Texas Hotel, Fort Worth, September 24-25.

American Society of Mechanical Engineers, sixth petroleum mechanical-engineer-



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Santa Fe—all the way

Santa Fe

ing conference, Mayo Hotel, Tulsa, September 24-26.

American Society of Mechanical Engineers, fall meeting, Radisson Hotel, Minneapolis, September 25-28.

October

American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Oklahoma City, October 3-5.

California Natural Gasoline Association, twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Hotel Beaumont, Beaumont, Tex., October 8-9.

American Oil Chemists' Society, fall meeting, Edgewater Beach Hotel, Chicago, October 8-10.

National Safety Council, thirty-ninth national safety congress and exposition, Stevens Hotel, Chicago, October 8-12.

Indiana Independent Petroleum Association, fall convention, Hotel Severin, Indianapolis, October 13-14.

Oil Progress Week, October 14-20.

American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.

American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.

National Metal Congress and Exposition, American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland, Detroit, October 15-19.

Institute of Gas Technology, annual meeting, Chicago, October 18.

National Association of Corrosion Engineers, South Central Region, annual meeting, Corpus Christi, Tex., October 18-20.

Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.

American Institute of Electrical Engineers, fall general meeting, Hotel Cleveland, Cleveland, October 22-26.

Society of Automotive Engineers, diesel-engine division, Drake Hotel, Chicago, October 29-30.

Society of Automotive Engineers, fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.

November

American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.

Gulf Coast Association of Geological Societies, first annual meeting, Roosevelt Hotel, New Orleans, November 15-17.

Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Olde College Inn, Houston.

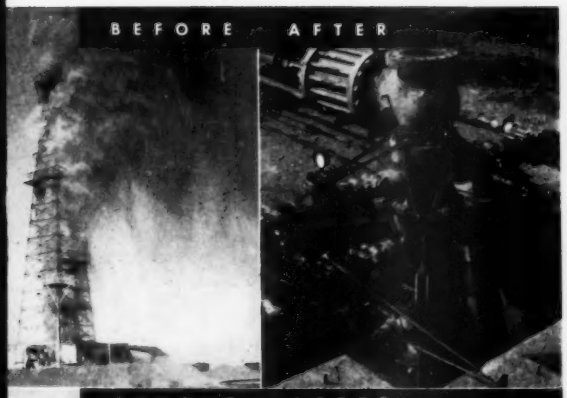
Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads: September 11, luncheon, Downtown Athletic Club; September 18, golf party, Knoll Golf Club, Boonton, N. J.; October 1 and October 29, regular meetings, Louis Sherry's; December 8, Christmas dinner dance, Hotel Pierre.

Cameron ★

WORLD HEADQUARTERS

★ FOR WILD WELL CAPPING EQUIPMENT . . .



Again Cameron equipment has flown to the rescue of operators in distress on opposite sides of the world. To Venezuela and Iran, on recent consecutive week-ends, were flown special capping manifolds fabricated from Cameron Pressure Operated Valves and Wellhead Equipment as prescribed by the famous wild well fighters of M. M. Kinley Co.

Cameron's incomparable equipment, experienced men, and versatile shop facilities are indispensable factors in getting the job done promptly, correctly, and satisfactorily.

Cameron invites operators who require assistance in emergencies — or with their day-to-day well control problems — to make full use of its facilities and experience.

Cameron

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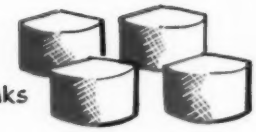
Easy Lesson in CONSERVATION ECONOMICS

If you have several cone roof tanks



that can be interconnected,

you can convert breathing losses

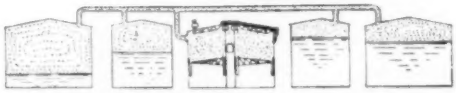
and filling losses

into profits quickly. Field studies at a typical gasoline plant

show $aving$ of more than 5,000 gallons

a week when six cone roof

tanks were hooked up



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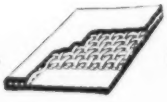
Wiggins DRY SEAL Gasholder.

Including expenses,

amortization took less than 20 months. What's more,

the Wiggins 100% DRY SEAL



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and snow

maintenance problems.

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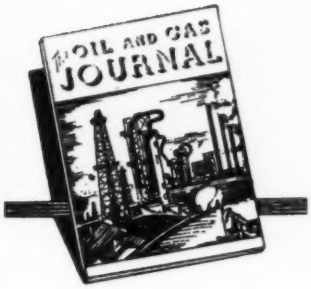

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JOURNALLY Speaking

What's in a Word?

Nothing so illustrates the character of the petroleum industry as the language it uses. And the industry's development from the early-day get-rich-quick operations to its present dignified and public-minded attitude is reflected in its choice of words.

Latest "bad" word kicked out is "bomb," which the specifications committee of the N.G.A.A. agreed should no longer be used since it has an undesirable connotation and is misleading.

The industry long ago began frowning on "boom," and drove that word out of its writings. "Exploit" is another on the skids, being replaced gradually by "develop."

One of the newest terms is "rig down," which is gaining ground in some areas as a substitute for the destructive-sounding "tearing down."

Who says the oil industry isn't progressive?

What's a Wildcat?

When the gobbledegook of ancient Greece got a little out of hand, Aristotle laid down the law to his associates. He said, in effect, if they wanted to chew the fat with him, they first would have to define their terms.

Down in Houston the other day an oil man's Aristotle came to grips with a PAD official on the same plane.

For years the oil industry has gone along talking about wildcats, just as if it were that simple. To some a wildcat was any test drilled a mile or more from proven production. Folks in Illinois didn't go along with that, since even a half mile away from one Illinois field they might find themselves in another.

Frederick Lahee, who heads A.A.P.G.'s committee on exploratory statistics, points out that a well drilled to extend a field might actually discover a new pool, and what starts out to be a wildcat might wind up as an extension well.

But, even with all this confusion, things went along fairly smoothly within the oil fraternity, with statisticians, scouts, and editors quibbling about the classification of various wells, but getting along nicely. Until, that is, PAD.

When this agency began saying who will get how much tubular goods for what purpose, oil companies began getting concerned over just what type of well they were considering. It seems a lot of applications for materials to sink into wildcats have been returned with the explanation that the contemplated wells weren't wildcats at all.

So, down in Houston an oil man cornered one of PAD's officials and popped the perplexing question. The answer: When it comes to allocating materials, a wildcat is a well intended to prove a new structure.

The floor is open. What is a wildcat?

What's Petroleum?

For years it has been a general assumption, in spite of Webster, that the word "petroleum" covers crude oil, natural gas, and the hydrocarbons in between.

Up in Canada the boys north of the border are about to get an official and legal definition of the term.

Alberta's Supreme Court already has held that natural gas and petroleum are two distinct resources—and it ruled that Imperial Oil, Ltd., had no right to produce the gas from under one Michael Borys' farm without his permission, since the company held only "petroleum rights."

Imperial is now studying the transcript of the testimony in the case and has until September 1 to appeal the decision.

Homecoming Hopes

Most Journal staff members still are casting an eye occasionally at their vacation dates on the calendar, but there's one who wishes nothing more than to be able to come back to work.

Bob Bradley, who formerly ran the reader-service department, is now a fighter pilot in Korea. At present he's on the ground—a spotter with the Eighth Cavalry Regiment.

While to some it might seem the ground is a more desirable place to be, Bob's looking ahead. Ground duty doesn't count on an airplane driver's credits for rotation. From the rain-soaked thirty-eighth parallel Bob writes:

"Only by flying 79 more missions can I hope to be rotated to the States. Time's awastin'."

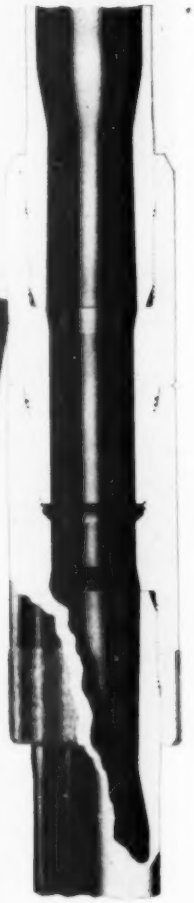
Ted Armstrong.

"We use them 100%"

says the Murfin Drilling Company of Wichita, Kansas

"We are now using **REED** Super Shrink-Grip Tool Joints 100% on all our rigs. Our experience has shown that these tool joints give exceptionally long service and are easy and economical to replace.

"The low drill string costs that result from our using **REED** Tool Joints is an important factor in our successful operation."



(Above and right) Orval Bridge and his crew coming out of the hole near Hays, Kansas. This is one of the Murfin Rigs equipped 100% with **REED** Super Shrink-Grip Tool Joints.

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the OIL AND GAS JOURNAL

June 28, 1951

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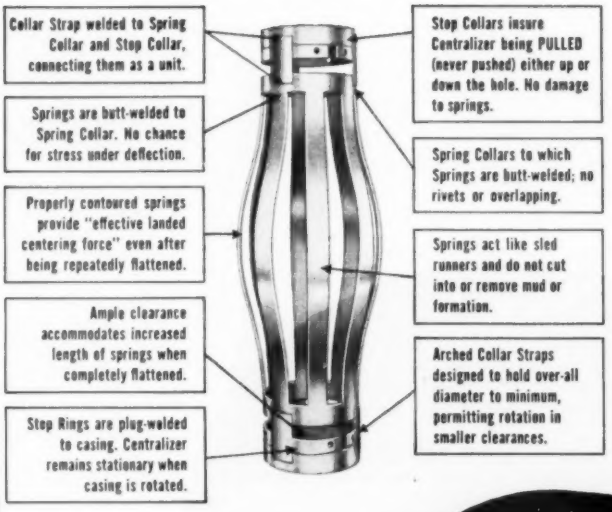
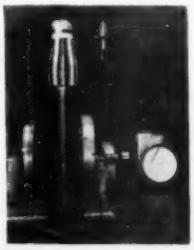
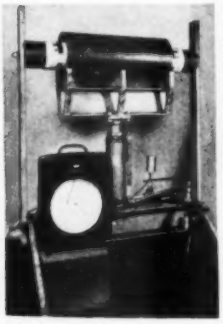

Collar Strap welded to Spring Collar and Stop Collar, connecting them as a unit.
Springs are butt-welded to Spring Collar. No chance for stress under deflection.
Properly contoured springs provide "effective landed centering force" even after being repeatedly flattened.
Ample clearance accommodates increased length of springs when completely flattened.
Stop Rings are plug-welded to casing. Centralizer remains stationary when casing is rotated.
Stop Collars insure Centralizer being PULLED (never pushed) either up or down the hole. No damage to springs.
Spring Collars to which Springs are butt-welded; no rivets or overlapping.
Springs act like sled runners and do not cut into or remove mud or formation.
Arched Collar Straps designed to hold over-all diameter to minimum, permitting rotation in smaller clearances.

EASY STARTING WITHOUT "SNUBBING"

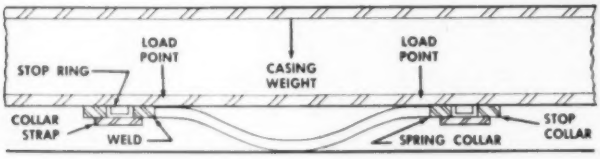
Testing to determine the maximum number of springs, of optimum bowed height and length, to insure easy starting, particularly of the first few joints when there is no accumulated weight. Minimum interval spacing of Baker Model "G" Casing Centralizers also was determined with this testing equipment.



With this testing device it is possible not only to simulate rugged downhole travel by repeatedly flattening the springs, but also to find the effective centering force of the centralizer in the open hole, after such treatment. The maximum centering force is easily determined from a performance curve showing centering force at various intervals of deflection.



Operators who know ALL the facts about the Baker Model "G" Casing Centralizer specify and run them exclusively. They know from experience that they are buying the greatest possible centering force for their casing, to be applied *exactly where they want it in the hole.* Isn't that what you too expect and really want from a casing centralizer?



Here is the ideal in spring design and mounting, found only in the Baker Model "G" Casing Centralizer. Note how the load point is imposed directly upon the casing; and how the properly "contoured" spring is free to move along the smooth surface of the casing as it deflects under compression. There is no chance for concentration of stress to cause a permanent set, or to result in breaking of the spring. Note that ample clearance exists between Stop Rings and Spring Collars to accommodate the increased length of the springs which results from their complete flattening.

Additional interesting facts and illustrations are contained in a new 16-page brochure which proves conclusively that no other spring-type centralizer even approaches the EFFECTIVE LANDED CENTERING FORCE afforded by the Baker Model "G" Casing Centralizer. Ask for your copy today from any Baker office or representative.

BAKER OIL TOOLS, INC.
Houston • LOS ANGELES • New York

A World Industry

As United States delegates return with first-hand reports and there is time to assimilate more of the information, the recent World Petroleum Congress at The Hague increases in importance.

The 10-day sessions reveal as never before that petroleum has become an international industry. Forty-four nations were represented and many nationalities contributed to current petroleum knowledge with 300 papers plus discussions covering every division of the industry.

The wide interest shown in the Congress' proceedings reflects the dominant part that petroleum has played in world recovery since World War II. The meeting was held in an area of greatest war devastation which could not have made the remarkable recovery that it has, had it not been for the many contributions of petroleum.

Now there is a general realization that in war or peace a nation's position largely revolves around its petroleum position. In the present emergency the abundance of petroleum is the Western Powers' greatest source of strength, and its scarcity the greatest lack of the enemy which must cover up this and other weaknesses behind an iron curtain.

The significance of the important changes that have taken place in the distribution of the world's petroleum supply was analyzed at The Hague.

The United States percentage of world crude-oil production is now 52.4, Middle East 17.2, and Venezuela 14.4. In 1938, the last calendar year before the start of World War II, the percentages were: United States, 61.1; Middle East, 6.1; Venezuela, 9.5. Since 1938, United States production has gained 85 per cent; Middle East, 505 per cent; and Venezuela, 227 per cent.

The Hague discussions emphasized the current and long-range significance of these figures.

World markets are determined by the areas of greatest surpluses, taking into consideration transportation costs. The Middle East now has available 2 million barrels daily of petroleum for world markets in the form of crude oil or products, and Venezuela's exports are approximately 1,600,000 bbl. daily. This country, long the controlling factor in world markets, is a net importer.

This in effect means that not only has the Eastern Hemisphere become largely self-sufficient in petroleum supplies, but with its large production and with proven and potential reserves exceeding those of any other section, it is becoming the center of world markets.

Obviously there is need to discuss these and allied matters, including special emphasis on technology with its many ramifications. Consideration should be given to the more frequent holding of these world forums. Collective information will solve many problems before they arise.

THIS WEEK

INDUSTRY—Study of 30 companies producing two-thirds of nation's oil shows increase in net earnings during 1950 of 23.6 per cent over previous year. . . . ¶More than half of gross tonnage going into new ships is for tankers, report shows. . . . At present, 481 tankers are under construction or on order. . . . ¶Republic Oil Refining Co. wins refund of pipe-line excise taxes. . . . Court rules oil movement on leased land was legally on its own premises. . . . ¶Panhandle Eastern, National Distilleries negotiating over formation of new joint petrochemical firm. . . .

ACTIVITY—Crude production averaged 6,119,500 bbl. daily for week ended June 23, up 17,400 bbl. daily. . . . Total completions were down 38 wells to 844 for the week. . . . Wildcat completions were off 1 well to 198 but still 45 wells over last year. . . . ¶Rotary rigs operating in United States on June 18 totaled 2,506 compared with 2,504 for previous week and 2,199 on same date last year. . . .

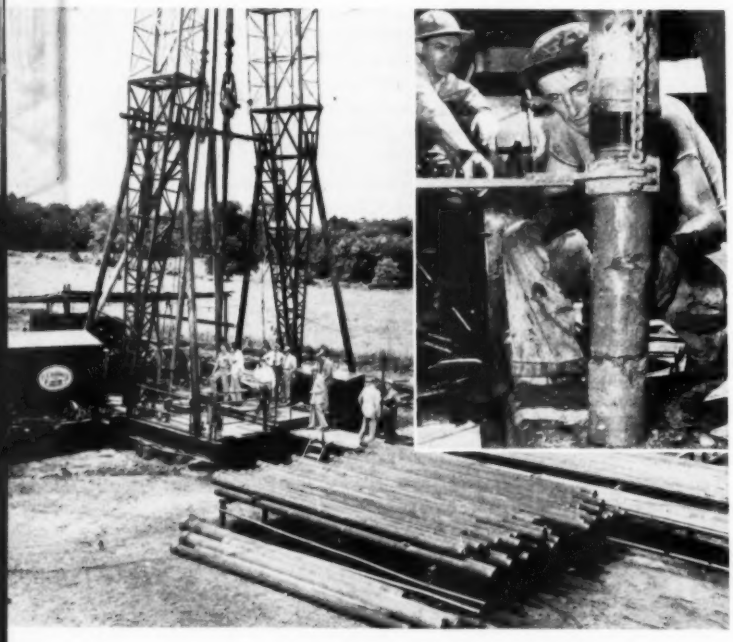
TRENDS—Refinery production of gasoline reached the all-time high of 3,127,900 bbl. daily for week ended June 16. . . . ¶Gasoline stocks decreased only 2,352,000 bbl. in the 3-week period ended June 16. . . . ¶Refinery runs averaged 6,545,000 bbl. daily for the same period to establish another record. . . .

PIPE LINES—Phillips to lay 498 miles of 8-in. to 12-in. loops to increase capacity of Borger, Tex.-Chicago products system. . . . Expansion to boost capacity 30,000 bbl. per day, permit substantial increase in movement of propane to Great Lakes area. . . . Completion expected by November 1. . . . ¶Mid-Valley to step up capacity of 1,000-mile Texas-Ohio crude line 80,000 bbl. per day. . . . ¶Southern Counties, Southern California ask FPC approval of plans to increase capacity of 30-in. Arizona-California gas line. . . . Loops would increase capacity from 405,000,000 to 555,000,000 cu. ft. per day. . . .

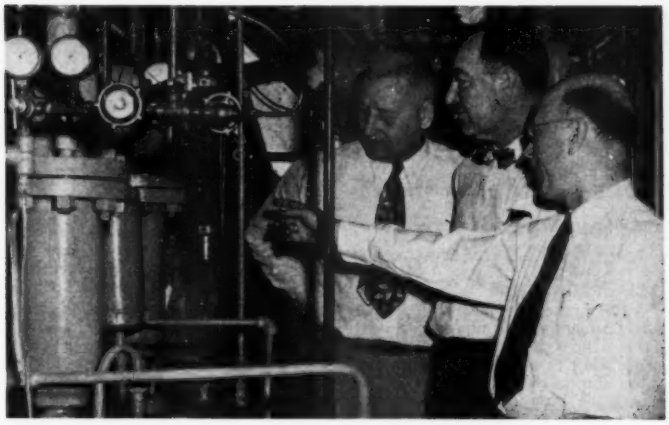
REFINING—British American opens new 5,200-bbl. refinery at Edmonton. . . . ¶Imperial holds official opening of new 10,800-bbl. refinery at Winnipeg. . . . Company simultaneously announces 2-cent cut in wholesale price of gasoline. . . . ¶Standard of Indiana announces plans to install new catalytic cracking unit and alkylation unit at Neodesha, Kans., refinery. . . . Completion expected by end of next year. . . . ¶Standard of Texas awards contract for construction of sulfuric acid-alkylation plant at El Paso. . . . ¶Bureau of Mines awards contract for design and construction of demonstration-scale retort using new gas-combustion process for continuous extraction of oil from shale. . . . ¶A.S.T.M. Committee D-2 accepts specifications for new 80-87 grade of aviation gasoline. . . . ¶J. M. Huber announces plans to double size of new Baytown furnace-type carbon-black plant. . . .

NATURAL GAS—Permit for first major export of natural gas from Alberta is granted to McColl-Frontenac and Union Oil Co. . . . FPC application filed for authority to build lines to carry gas to Butte, Mont. . . . ¶Cities Service asks FPC authority to acquire depleted Colony and McLouth gas fields in Kansas for use as underground storage facilities. . . .

GOVERNMENT—Senate getting ready to consider House-passed tax bill which would add new taxes on petroleum-industry operations. . . . ¶Venezuela seeks cut in 21-cent a barrel tax on imports above quota. . . . ¶Legislation introduced aiming at restrictions on foreign registry of tankers built for American firms. . . . ¶Chapman begins fight to obtain more steel for oil-industry operations. . . .



NOT LOOKING FOR OIL.—This rig is drilling a hole which will be valuable to the operators as nothing more than a dry hole. Well Surveys, Inc., plans to use it as a permanent test hole in which the company can evaluate radioactivity logging processes. The hole has been cored with a 4¾-in. diamond bit from 40 ft. on down. The company plans to run various types of logs and, by comparing traces with each other and with the cores, achieve more accurate interpretation than heretofore possible. Information obtained is expected to provide improved interpretation in the field. For details on the operation *see page 157.*



STUDIOUS VISITORS.—Dr. Blaine B. Wescott, right, explains operations of a fluid-type catalyst pilot unit at Gulf's Pittsburgh laboratories during the company's production-engineering conference. At left is T. W. Rhoads, division gas-gasoline supervisor of the Fort Worth production division. Center is E. P. Hubbard, for 2 years chairman of Gulf's production research coordinating committee. Wescott is assistant to the vice president of Gulf Research & Development Co., which acted as host for the meeting.

Drilling With Oil

Emulsified oil in drilling fluids described as valuable technique at Gulf conference; automatic drilling favored

PITTSBURGH, Pa.—Use of emulsified oil in drilling fluids was hailed last week as one of the most significant drilling techniques developed in recent years.

J. P. Weichert, district engineer for Gulf Oil Corp., Houston division, told production men at the company's annual production - engineering conference that drilling time for some formations in Gulf Coast fields has been cut in half by using this type of fluid.

In addition, he said, the fluid has increased bit life and time on bottom and decreased rotary torque, pipe drag, and circulating pressure. It has made easier the drilling of high-angle directional holes, the completion of difficult fishing jobs, and drilling of troublesome sloughing shale.

It has been found particularly useful for increasing productivity of tight, low-pressure sands. Still another important factor, reduction of over-all costs of drilling mud, is achieved by use of oil-emulsion fluids, Weichert said.

The lubricating quality of the oil, he explained, is responsible for these advantages. The oil droplets distributed throughout the mud serve both to facilitate movement of equipment in the hole and to keep shale cuttings from sticking to bit, drill collars, and pipe. They also seal walls in the drill hole, reducing loss of water and enlargement of the hole.

Automatic drilling.—Twist - off hazards, drilling time, and bit wear will be greatly reduced as automatic drilling of oil wells is perfected, John H. Starbird, production engineer at Paloma, Calif., told the conference.

The mechanical elimination of human error by automatic weight control of the drill string also can give directional accuracy to drilling, he said.

Some such devices already have been used successfully in the field, Starbird said, and a number are in the experimental stage.

Automatic production. — Taking up application of the automatic principle to producing oil leases, E. L. Petree, district superintendent of production, Houston division, reported that leases totaling 415 wells in East Texas now are using the method, and tentative plans are to substantially increase this number.

Widespread employment of the method will permit the setting up of the general production operation on "assembly-line basis," Petree said.

Pumpers will make routine checks of wells and tank batteries to determine if the wells are producing correctly. Producing equipment will be checked periodically by technicians for necessary servicing, and lease maintenance (cleaning and painting equipment and flow-line repair) will be done on contract.

Automatic production, he said, makes possible the production of every well every day; the staggering of well flow schedules to provide a constant flow of gas to the gasoline plant; and greater over-all economy of operation.

Secondary recovery.—A thorough examination of all Gulf properties as to the feasibility of expanding pressure-maintenance or secondary - recovery operations was urged at the conference by R. V. Cruce, district reserve advisor of the Houston division.

Cruce said such operations now being conducted in the Gulf Coast and other districts have proved beyond all doubt the outstanding benefits thereby derived. More oil is recovered, operating costs are reduced, and the length of the depletion period is cut, he said.

A spectacular proof of high returns from employment of the secondary-recovery operation may be found in production figures from East Texas field. Cruce said the field had produced 1,727,000,000 bbl. of oil by 1942 when it was placed under water injection. Since then 1,060,000,000 bbl. have been recovered.

Other engineers reported greatly increased recovery from projects in other districts. J. R. Hamilton, area petroleum engineer for the Fort Worth division, said some reservoirs are now giving up more oil under gas lift in West Texas than could be produced by any other common artificial lift.

A secondary-recovery program in eastern Venezuela involving both gas and water injection has resulted in recovery of about 12 per cent of all the oil originally contained in the reservoir, according to George W. Dawson, reservoir engineer for Mene Grande Oil Co.

The method eliminated the need for added wells to recover the oil, promoted continuation of natural flow, and tended to shorten production time, he said.

Largest meeting. — About 250 engineers, research scientists, technicians, and executives attended the conference this year. All company-producing divisions in the United States, Canada, South America, Europe, and the Middle East were represented at this sixth and largest meeting.

Subjects treated ranged from crude oil dehydration to stress - corrosion cracking of well equipment under severe sulfide - producing conditions. Much emphasis was given to problems of lost circulation and squeezing more production from existing fields.

Gas-Expansion Plans

Pipe-line, utility companies will spend 4½ billions in next 5 years for new facilities, A.G.A. says in forecast

NEW YORK.—More than 4½ billion dollars will be spent by gas utility and pipe-line companies for construction of new facilities and plant expansion during the next 5 years, according to a survey just completed by the American Gas Association.

The total of $4,592,100,000, which American gas and transmission companies plan to spend in 1951 through 1955 compares with $3,994,500,000 actually spent for construction during the 5-year period 1946-50. The 1950 expenditures totaled $1,198,300,000, which was $130,000,000 more than forecast 12 months ago.

Nearly half the total, or 2.40 billions, will be spent on transmission lines, compared with 2.19 billions spent on natural-gas lines during the previous 5 years. The forecast is based on projects approved by the Federal Power Commission plus others believed likely to receive approval.

Noting that the forecasts in the accompanying table decrease sharply during the latter part of the period, the A.G.A. stated that uncertainty as to the world situation, prices, and the availability of materials make long-range forecasting difficult so that these estimates very likely are understated. It added that the estimates for 1953 and 1954 are almost double those forecast in its survey of a year ago.

For the first time the survey includes an estimate of expenditures for underground storage of natural gas, forecasting that $92,000,000 will be spent to provide such storage during the coming 5-year period.

The table also indicates the extent to which natural gas is displacing manufactured gas, since the forecast expenditures for all other types of gas add up to less than 10 per cent of the amount scheduled for natural-gas facilities.

GAS UTILITY CONSTRUCTION EXPENDITURES, BY TYPE OF GAS AND BY PLANT FUNCTION, 1950-1955
(Millions of dollars)

Type of gas and plant function—	Actual	Forecast					Total forecast	Total actual
	1950	1951	1952	1953	1954	1955	1951-1955	1946-1950
Natural gas—total	$1,095.7	$1,433.8	$1,205.8	$636.4	$494.1	$424.8	$4,194.9	$3,433.4
Production	76.7	89.1	95.1	50.8	38.0	34.6	314.8	
Underground storage	25.7	29.8	37.3	13.9	8.7	2.3	92.0	372.6
Other storage	9.3	10.8	9.1	9.5	13.5	3.8	46.7	
Transmission	713.3	994.8	773.0	295.4	185.8	146.8	2,395.8	2,187.8
Distribution	236.4	269.9	251.9	235.3	229.2	218.5	1,204.8	754.2
General	34.3	39.4	34.4	24.3	18.9	18.8	140.8	118.8
All other types of gas—total	$102.6	$167.8	$90.6	$71.1	$59.7	$68.0	$397.2	$561.1
Production and storage	31.7	30.2	30.5	20.3	14.5	16.2	111.7	229.7
Transmission	3.0	1.8	4.4	4.4	3.0	4.0	17.6	20.1
Distribution	63.2	70.3	50.2	42.2	38.2	41.3	242.2	287.2
General	4.7	5.5	5.5	4.2	4.0	6.5	25.7	24.1
Total industry—total	$1,198.3	$1,541.6	$1,296.4	$707.5	$553.8	$492.8	$4,592.1	$3,994.5
Production and other storage	117.7	130.1	134.7	87.8	66.0	54.6	473.2	602.3
Underground storage	25.7	29.8	37.3	13.9	8.7	2.3	92.0	
Transmission	716.3	996.6	777.4	299.8	188.8	150.8	2,413.4	2,207.9
Distribution	299.6	340.2	302.1	277.5	267.4	259.8	1,447.0	1,041.4
General	39.0	44.9	44.9	28.5	22.9	25.3	166.5	142.9

Source: Bureau of Statistics, American Gas Association

More Tankers

481 on ways or ordered total 5,693,015 tons

NEW YORK.—More than half the total tonnage in new ships being built throughout the non-Communist world is now going into tankers.

According to a report made public by the Shipbuilders Council of America, 481 new tankers now on the ways or ordered aggregate 5,693,015 gross tons. This compares with 1,329 merchant ships of all types totaling 10,562,215 gross tons, on which new construction has begun or is on order outside the U.S.S.R. and satellite countries.

The United States ranked seventh in tanker construction as of April. Great Britain led all countries with 55 per cent of gross tonnage now building. Domestic shipyards have since increased that schedule.

Large seagoing or inland-waters vessels under construction or on order in this country as of June 1 are reported by the Shipbuilders Council to include 21 tankers with total gross tonnage of 330,100. Averaging 15,700 gross tons each, these new tankers will range in size from 11,950 to 19,000 gross tons. The June backlog compares with only 6 tankers scheduled as of January of this year.

Of the 21 tankers, 16 are marked for completion in 1952 and the remainder will be in operation in early 1953. Esso Shipping Co. leads with 6 tankers on order, followed by The Texas Co. with 4, Sinclair Refining Co. and Sun Oil Co. with 2 each and California Transport Corp., Socony-Vacuum Oil Co., and Union Oil Co. of California with 1 each. Four are being built for undisclosed interests.

Tanker construction throughout the free world showed consistent gains this year. April schedules showed an increase of 50 per cent over those of a year previous in the number of ships contracted. The gain over January 1951 was 124 tankers, up 35 per cent. The trend toward larger tankers is also evident in the average gross tonnage per ship of 11,800 in April of this year, compared with an average of 11,200 gross tons a year ago.

The accompanying table shows the status of tanker construction as of April, compared with totals of the previous quarter and of April 1950.

Country—	No. of vessels	Gross tons
Great Britain	259	3,122,335
Sweden	77	908,050
Holland	42	531,620
Germany	23	271,350
Norway	23	203,474
Denmark	16	170,213
United States	9	136,500
France	5	76,628
Belgium	7	70,151
Japan	8	68,010
Italy (except Trieste)	3	46,600
Canada	3	39,000
Spain	5	28,084
Trieste	1	21,000
Total, April 1951	481	5,693,015
Total, January 1951	357	4,017,149
Total, April 1950	320	3,600,023

Republic Wins Tax Case

PITTSBURGH. — Several refining companies may be due for a tax refund as a result of a federal court ruling here last week.

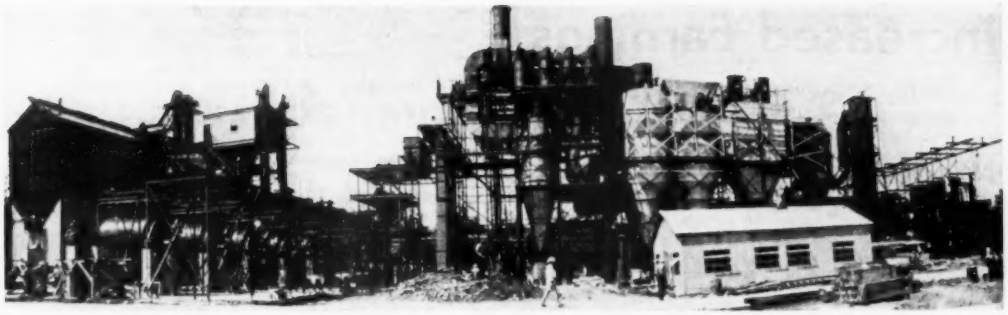
Federal Judge Wallace S. Gourley held that Republic Oil Refining Co. must be reimbursed $23,495 it paid in pipe-line excise taxes for transportation of crude oil from Galveston Bay wharves to its Texas City refinery.

Republic had contended it was not liable to the tax on the ground that movement of the oil from ship to refinery did not constitute transportation since the movement was handled entirely on land leased from Texas City Terminal Railway Co.

The Government maintained that movement of the oil through a 2,500-ft. pipe line constituted transportation and therefore was subject to tax.

Judge Gourley said he ruled in Republic's favor because he believed that the company's leasing of the pipe lines constituted ownership of the premises under Texas law. Republic actually was loading and unloading oil on what was legally its own premises, he said.

The Internal Revenue Code for 1941 provides a tax of 4½ per cent of the transportation cost of crude and products moved by pipe line.



NEW OPERATION.—This is the recently completed furnace-type carbon-black plant of J. M. Huber Corp. at Baytown, Tex. The plant now has a capacity of 100,000 lb. per day. A current expansion program, to be completed this autumn, will boost capacity to about 200,000 lb. daily.

Growing Plant

Huber raises carbon-black capacity of Baytown plant

BAYTOWN, Tex.—J. M. Huber Corp. is doubling capacity of its 100,000-lb. per day carbon-black plant which just recently went on stream here.

The furnace-type plant receives fuel oil from several Houston area refineries, cracks the oil and burns it under incomplete-combustion conditions to produce the HAF-type carbon black.

Cost of the plant when present expansion is completed will be approximately $3,000,000. It was designed by J. M. Huber Corp. and built by Stearns-Roger Manufacturing Co.

Huber owns two other furnace-type plants and one channel-black plant. Combined output upon completion of present construction, expected early this autumn, will be about 500,000 lb. per day.

Plant process.—At the Baytown plant fuel oil is heated in a direct-fired preheater.

Entering the furnace, it is diluted with a stream of combustion gas—natural gas plus air—to bring it to its cracking temperature of about 2,400 F° and to keep it in a finely divided state to facilitate rapid decomposition. The air-oil ratio is maintained so that approximately half of the hydrocarbons are decomposed to carbon black. Heat is obtained partly from the combustion gases and partly from the hydrocarbons that are completely burned.

Six furnaces are used and are connected to two water-spray coolers and two cooling towers, where the carbon black is cooled to a temperature of 450° F.

From these the product enters an electrical precipitator, where the carbon particles begin to collect on each other.

The stream of carbon, mixed with flue gas and steam, then is collected by four cyclones, normally the final step before pelletizing. At the Baytown plant, however, a secondary set of 16 cyclones strips the carbon from the black exhaust gas from the primary set.

Exhaust gases from the secondary cyclones pass through a water scrubber and emerge practically devoid of carbon.

Carbon black leaving the cyclones is pelletized before being transferred to storage.

New Avgas Grade

A.S.T.M.'s Committee D-2 adopts specifications for new 80-87 grade of aviation gasoline; rejects 108-135 grade

George Weber

ATLANTIC CITY. — Specifications for a new grade of aviation gasoline were accepted here last week by Committee D-2 of the American Society for Testing Materials.

The committee accepted specifications for 80-87 grade gasoline to be incorporated in the A.S.T.M. Standards on Petroleum Products and Lubricants.

A second grade, 108-135, was referred back to Technical Committee J on aviation fuels for further consideration.

Specifications for the 80-87 grade gasoline call for a minimum of 80 octane number lean rating and 87 octane number rich rating. The fuel will be red in color and may contain not more than 0.5 ml. of tetraethyl lead per gallon.

They also provide that: "If mutually agreed upon between the vendor and the purchaser, Grade 80-87 may be required to be free from tetraethyl lead. In such a case, the fuel shall not contain any dye and the color as determined in accordance with Standard Method of Test for Color Refiner Petroleum Oil by means of Saybolt Chronometer shall not be darker than plus 20." Net heat of combustion was placed at a minimum of 18,700 B.t.u. per pound.

No method change.—The committee referred back to Technical Committee A a proposal to change from the motor method to the research method in determining the octane rating of motor gasolines.

Committee members felt that opinions expressed by the general public and others interested were not sufficiently decisive to justify the change at this time.

Committee D-2 early this year had invited comments on the proposed change.

Minor revisions were made in the diesel fuel-oil specifications. One raised the flash point of No. 2D grade from "100° F. of legal" to "125° of legal."

New officers.—At a general meeting of the society Truman S. Fuller, General Electric Co., was elected president, and L. C. Beard, Jr., Socony-Vacuum Oil Co., vice president.

Beard, who is assistant director of Socony-Vacuum Laboratories, is currently first vice chairman of Committee D-2.

There were few changes in committee officers at the meeting.

All three officers of Technical Committee F on diesel fuels tendered their resignations on the basis of long service, and a new slate of officers will be proposed shortly.

The resigning officers are C. G. A. Rosen, Caterpillar Tractor Co., chairman; J. R. Jackson, Association of American Railroads, vice chairman; and W. G. Ainsley, Sinclair Refining Co., secretary.

The 1952 annual meeting, which will mark the society's fiftieth anniversary, will be held in New York June 23-27. Committee D-2 plans a symposium next year in cooperation with Rubber Reserve on butadiene.

Increased Earnings

Thirty companies representing two-thirds of oil industry show gain of 23.6 per cent in net income during 1950

NEW YORK.—The combined net earnings of 30 oil companies during 1950 were 23.6 per cent higher than in 1949, according to the annual financial analysis prepared by Frederick G. Coqueron and Joseph E. Pogue of the petroleum department of Chase National Bank.

The group of companies studied is said to comprise about two-thirds of the petroleum industry in the United States, as the 30 concerns produced 3,669,000 net barrels of crude per day and ran 5,729,000 bbl. per day to refineries during 1950 in both domestic and foreign operations.

With gross operating income up 11.6 per cent, the combined earnings of the 30 companies amounted to $1,739,000,000, an increase of 23.6 per cent over 1949, the study showed. Total income for the year was $15,574,000,000, which was 12.1 per cent over the previous year.

Taxes charged to income increased 46.1 per cent over 1949 and totaled $1,150,000,000. The 30 companies also collected nearly $2,000,000,000 in consumer taxes on its products for various government agencies.

Cash dividends on preferred and common stocks of the group amounted to $686,000,000 which was the largest disbursement in its history. This outlay represented 39.4 per cent of available earnings. The balance of $1,053,000,000 was retained or reinvested in the business.

The working capital of the 30 companies at the end of 1950 amounted to $3,852,000,000, an increase of $414,000,000 over 1949 which was derived mainly from earnings in excess of dividend and capital expenditure requirements.

Principal declines from the previous year in the group's financial picture were in the categories of capital expenditures, outstanding debt, and new financing. Capital expenditures aggregated $1,894,000,000 in 1950, a decline of 17.1 per cent. Net reduction of debt amounted to $181,000,000. New financing by the companies totaled only $159,000,000, compared with a peak of $682,000,000 in 1947. Borrowings accounted for $152,000,000 of the new financing and $7,000,000 resulted from the sale of common stock.

The accompanying table summarizes the principal findings as reported in the study.

FINANCIAL AND OPERATING SUMMARY OF 30 OIL COMPANIES
(Millions of dollars)

	1948	1949	1950
Total income	14,728	13,892	15,574
Total costs and other deductions	12,799	12,485	13,835
Net income carried to surplus	1,929	1,407	1,739
Net income in per cent of total income	13.1	10.1	11.2
Preferred and common dividends declared	475	564	686
Dividends in per cent of net income	24.6	40.1	39.4
Net assets:			
United States	8,420	9,049	10,127
Foreign countries	1,867	2,136	2,164
Total	10,287	11,185	12,291
Current assets	5,381	5,347	6,229
Current liabilities	2,321	1,909	2,377
Net working capital	3,060	3,438	3,852
Ratio of assets to liabilities	2.3	2.8	2.6
Capital expenditures:			
Production	1,517	1,326	1,193
Transportation	311	230	151
Refining	579	452	281
Marketing	215	218	233
Others	86	58	36
Total	2,708	2,284	1,894
Production in per cent of total	56.0	58.1	63.0
Net investment in fixed assets:			
Production	4,449	4,883	5,101
Transportation	1,239	1,348	1,308
Refining	1,783	2,081	2,208
Marketing	1,293	1,387	1,482
Others	342	283	270
Total	9,106	9,982	10,369
Production in per cent of total	48.9	48.9	49.2
Borrowed capital	2,271	2,604	2,423
Invested capital*	10,925	11,818	12,915
Total	13,196	14,422	15,338
Borrowed capital in per cent of total	17.2	18.0	15.8
Average borrowed and invested capital*	12,214	13,809	14,380
Net income†	2,079	1,543	1,886
Return on borrowed and invested capital (%)	17.0	11.2	12.7
Net crude production (1,000 bbl. daily):			
United States	3,043	2,671	2,784
Foreign countries	782	774	885
Total	3,825	3,445	3,669
Crude runs to stills (1,000 bbl. daily):			
United States	4,690	4,570	4,943
Foreign countries	644	670	786
Total	5,334	5,240	5,729

*Includes minority interests. †Before deducting interest charges and minority interests.

Petrochem Firm Organizing

NEW YORK.—Negotiations are still in progress between Panhandle Eastern Pipe Line Co. and National Distillers Corp. leading to the formation of a new joint petrochemical operation.

The project will employ as a raw material natural gas handled in Panhandle's 4,800-mile pipe-line system. The plant will be located at some point along the company's right-of-way between the Texas Panhandle and Chicago.

No official announcement has been made by either company.

This latest development follows a pattern in which companies in the oil and gas industry with available supplies of hydrocarbon raw materials join with companies in the chemical industry to form cooperative ventures in the petrochemical field.

Gas Executive Joins PAD

WASHINGTON.—George A. Wilson, president of the Interstate Natural Gas Co., New Orleans, has been appointed director of PAD's supply and transportation division, serving without compensation.

Wilson succeeds Dene B. Hodges, vice president of Shell Oil Co., who has resigned to return to his company, for which he will shortly go to London.

Wilson returns to a job he held in the Petroleum Administration for War from 1943 to 1945. Later he served for a time as assistant to the vice president and general manager of the Louisiana division of Standard Oil Co. (N. J.). He has been a member of the Military Petroleum Advisory Board since 1947.

Refinery Opening

British American inaugurates new 5,200-bbl. refinery at Edmonton; plant houses Alberta's first cat cracker

Kenneth B. Barnes

EDMONTON, Alta.—British American Oil Co., Ltd., opened its newest refinery here this Wednesday, another step forward in the development of Alberta's oil economy.

The Hon. E. C. Manning, premier of Alberta, officially inaugurated this newest B-A refinery, situated a few miles east of the city, a year and a month after Premier Manning broke ground for the first foundations in May 1950.

Process units.—The refinery is designed to process 5,200 bbl. of crude oil per day. The new plant consists of a combination unit for crude topping, plus delayed coking and catalytic and thermal cracking units. The process equipment also includes gas-recovery sections and treating facilities.

This is the first catalytic cracking unit to be installed in a refinery in Alberta. It is the second cat cracker to be installed by British American. The first operates at the company's Montreal East refinery.

Steam is manufactured by boilers with capacity of 120,000 lb. per hour; included is a complete feed-water treating system and other necessary facilities.

Water supply.—The refinery is supplied with water from the North Saskatchewan River. Two intake lines run into the river for a distance of 300 ft. and are anchored to the river bed by concrete footings. The water flows through the intake lines to the deep-well pump house on shore, where pumps move the water to the refinery—a distance of 6,000 ft. and 250 ft. elevation above the river.

High-voltage electricity is supplied by the local power company to substations at the edge of the refinery. The entire plant is protected from fire by water-hydrant and air-foam systems.

In addition to manufacturing units there is an administration building where all engineering, accounting, and administrative activities are centered; a laboratory building where products are quality-control tested; a combination stores and shops building; plus a changehouse for the refinery personnel which includes a locker room, wash room, and lunch room.

Crude supply.—Most of the crude used in the refinery will be supplied by pipe line from Alberta's Redwater field. Refinery tankage has been provided in the amount of 460,000 bbl. for processing and storing finished products.

The northern part of Alberta and parts of Saskatchewan and British Columbia will be served by the new refinery.

Construction.—The B-A plant designer was Canadian Kellogg Co. The plant site is 160 acres. Total daily consumption will amount to 16,800 kw.-hours. About 12,100 tons of steel was required for the tanks. Operating staff will total 150 people.

Other refineries.—In addition to Edmonton, B-A has refineries at Calgary, Moose Jaw, Clarkson, and Montreal East.

The largest of these is Montreal East, opened in 1931, where daily capacity has reached 40,000 bbl. The original Toronto refinery, opened in 1907 and enlarged between 1910 to 1919 when marketing operations in Ontario and Quebec were extended, now is used only for experimental work and as a storage depot.

The company's Moose Jaw refinery was opened in 1934. At present it is undergoing expansion which, when completed early next year, will more than double its capacity.

B-A's first refinery in Alberta was opened at Calgary in 1939. The Clarkson refinery was built during World War II and opened in 1943.

Officers.—On hand at the opening of the new refinery were British American's president, W. K. Whiteford, and M. S. Beringer, vice president for manufacturing. M. T. Stevens is manager of the refinery. J. Gerald Godsoe is vice president and general officer; Robert E. Kepke, vice president for supply and transportation; Ole Berg, Jr., vice president, marketing; and H. T. O'Neill, vice president, finance.

Exports Approved

First permit granted for movement of gas to U. S.

EDMONTON.—The first permit covering major gas export from western Canada was issued last week by the Alberta government to McColl-Frontenac Oil Co. and Union Oil Co. of California. Both companies own important natural-gas reserves in southeast Alberta.

The permit allows the two companies to supply natural gas to Montana Power Co., of Butte, Mont., "for use or consumption in the mining, smelting, reduction, and refining operations of Anaconda Copper Mining Co." at Butte.

It was issued as a "defense production emergency" because Montana Power Co. was unable to meet Anaconda's gas requirements. Originally, Charles E. Wilson, U. S. director of defense mobilization, requested the gas for Anaconda's operations, and Premier E. C. Manning introduced a special bill in the legislature for export of 40 million cubic feet daily.

The permit, however, limits movement to a 5-year total of 43.8 billion

SOUND WARNING.—Humble's sign should be taken seriously by tourists who aren't equipped with their own pontoon bridge. The interruption in the road is the Nueces River, which Humble drilling crews must cross to reach a company wildcat in the marshlands about 12 miles from Corpus Christi. Humble built up the road through the marshland and then devised this pontoon bridge for the river crossing, over which it hauled road building materials, later the rig and all equipment, and now the drilling crews.

cubic feet, or a daily average of about 24 million. The legislature had approved a 5-year export total of 50 billion cubic feet.

Pipe-line request.—Permit issuance clears the way for the Board of Transport Commissioners to deal with an application filed with the Federal Power Commission by Montana Power for construction of 70 miles of 16-in. line extending from Pakowki Lake area in Southeast Alberta to a point near Cut Bank, Mont., where the proposed line would connect with Montana Power's existing system.

The two segments, 18 miles in Canada and 52 miles in the United States, would be owned and operated by two newly formed subsidiaries of Montana Power.

Montana Power said the gas reserves now available to it are depleted to a point where it would be necessary to curtail industrial gas loads unless a new source of supply were obtained.

Gas supply.—McColl-Frontenac and Union would furnish gas for the new line from fields located in the Pakowki Lake area, including Pendant d'Oreille, Manyberries, Smith Coulee, and Black Butte.

Application of Montana Power states the most recent estimate of reserves in these fields is 488.5 billion cubic feet of gas in place; of this total, 434.2 billion is recoverable reserve, and a net marketable reserve of 406 billion cubic feet is estimated.

Current consumption.—During 1950, sales of natural gas to Alberta consumers were 51.45 billion cubic feet compared with 42.29 billion in 1949. Natural-gas production in Alberta totaled 82.2 billion cubic feet during 1950, which compares with 58.97 billion cubic feet produced in 1949.

Southeastern Alberta gas reserves were originally developed to obtain a supply which might justify installation of a synthetic gasoline plant; however, with discovery of Leduc in 1947 and the ensuing oil boom, all plans for building a synthetic gasoline plant were dropped.

New Chemical Project

MONTREAL.—Shell Oil Co., Ltd., will build a $3,000,000 petrochemical plant adjacent to its 25,000-bbl. Montreal East refinery.

W. M. V. Ash, president, said the new plant will produce 20 million pounds of acetone and isopropyl alcohol annually.

The Shell announcement brings to three the proposed petrochemical projects for Canada's largest refining center at Montreal East.

Several months ago, Dominion Tar & Chemical Co., Ltd., announced plans for an ethylene glycol plant which will utilize cracked refinery gases from the 40,000 bbl. per day refinery of McColl-Frontenac Oil Co., Ltd.

More recently, British American Oil Co., Ltd., revealed plans for a new chemical company to be jointly owned with Shawinigan Chemicals, Ltd. No announcement has been made as to what this plant will produce, but like the other two Montreal projects it is believed to be based on the olefin hydrocarbons produced in the thermal and catalytic cracking processes employed in the three refineries.

Price Slash

Imperial refinery opening brings 2-cent gasoline cut

WINNIPEG, Man.—Imperial Oil Ltd.'s new $10,000,000 refinery here went on stream officially last week, and simultaneously wholesale gasoline prices in the area were cut 2 cents a gallon.

This reduction, along with previous price cuts, have lowered the Winnipeg wholesale price 5.2 cents since last October. It has been made possible by western oil production and displacement of imports from Ontario with Manitoba-made products.

In addition to the gasoline-price cut, furnace fuel-oil prices were reduced 1 cent and diesel-oil prices ½ cent in the area.

Third reduction.—This was the third reduction in gasoline prices since last fall. The first came in late October when transportation costs were lowered by initial shipments of Alberta oil as far as Regina through the new Interprovincial pipe line. The second cut came last April when Alberta crude producers lowered their prices to deliver crude to Ontario refineries at a competitive price.

Gasoline prices here are now 18 per cent lower than they were last October.

Imperial's new 10,800-bbl. plant was officially opened when Premier D. L. Campbell closed a switch starting gasoline from the refinery flowing into a tank car.

It will process Alberta crude into gasolines, heating oils, diesel and bunker fuels, and asphalts. The refinery's new fluid catalytic cracker is the first such unit in Manitoba.

Industry Briefs

BATON ROUGE.—A resolution has been introduced in the Louisiana legislature asking an investigation of salt-water contamination of water used to irrigate the state's rice fields. The resolution, which blamed oil-production operations in Acadia Parish, said this year's rice crops in the area have been "seriously damaged."

TULSA.—The International Petroleum Exposition probably will be held in 1953. W. G. Skelly, exposition president, and William B. Way, general manager, said the current materials and manpower situation were resonsible for the decision to postpone the event, orginally scheduled for 1952. The Petroleum Equipment Suppliers Association at its annual convention last week voted against holding the exposition in 1952.

WASHINGTON.—The Senate interstate commerce committee has approved the nomination of Claude L. Draper for another 5-year term on the Federal Power Commission. Draper has been a member of the commission since 1930.

NEW YORK.—Columbia Engineering Corp., subsidiary of Columbia Gas System, Inc., has changed its name to Columbia Gas System Service Corp.

RIVERTON, Wyo.—Sinclair Oil & Gas Co. has offered Riverton Petroleum Co. $2,500,000 for its interest in Sand Draw field near here. The offer was disclosed at a meeting of Riverton's directors. A survey of stockholders is to be made before a decision on the offer is reached.

BATON ROUGE.—Louisiana oil activity experienced another upward surge during May. Drilling permits increased from 191 in April to 222; well completions rose from 135 to 146, including 22 wildcats of which 6 found oil or gas. At the end of the month, 281 rigs were active, including 70 wildcats either drilling or on location.

WASHINGTON.—John A. Walstrom, vice president of Asiatic Petroleum Corp., New York, has been appointed director of the foreign supply and transportation division of the Petroleum Administration. Walstrom, who will serve without compensation, was in the Navy from 1941 to 1946 and at one time was director of supply and distribution for the Army-Navy Petroleum Board.

HOUSTON.—Houston Oil Co. will build a $30,000,000 paper pulp mill near Evadale, 20 miles north of Beaumont. Through its subsidiaries the company owns vast tracts of fee land throughout East Texas, much of it in timber. Scott Paper Co. will be joint owner of the plant.

WASHINGTON.—A 5-year extension of the Interstate Oil Compact from September 1 has been approved by the Senate. There was no debate on the measure, which is similar to one now pending in the House interstate commerce committee.

Answers on Materials

PAD lists most commonly asked questions on use of its forms for obtaining assistance; here are their answers

WASHINGTON. — Questions most commonly arising in the industry regarding the operation of the amended M-46 order have been answered by the Petroleum Administration for Defense.

Largely concerned with operations subsequent to production, the questions covered by PAD detail the procedures to be followed in securing materials and the limitations imposed upon the use of priority ratings.

Q. Who can use the order?

A. Anyone engaged in the petroleum or gas industries and whose operations are located in the United States or Canada.

Q. What types of materials are covered?

A. All types. Of course, certain materials are under allocation control by NPA and in such cases the ratings assigned in the order may not be helpful in obtaining these types of materials. The operator should file as required by the special allocation orders and may request PAD assistance in presenting his application under these special orders.

Q. Must priorities assistance be requested if the material can be obtained without it?

A. No. Section 19 states than an operator may not use the symbol authorized in the order if the material can be obtained without the use of priorities assistance.

Q. If an operator can get material without priorities assistance, does he have to file copies of delivery orders for such material?

A. No.

Q. Does the order cover all types of petroleum operations?

A. No. The order does not provide priorities assistance to obtain material for use by consumer accounts. In general also the order does not provide assistance to obtain material to be used in connection with tank trucks, railroad rolling stock, or marine equipment.

Q. A few companies not ordinarily part of the industry, although they may serve the industry, maintain laboratories wholly devoted to research in petroleum. May the owners of such laboratories avail themselves of the provisions of M-46 in securing necessary supplies for their laboratory operations?

A. When the laboratories are handled separately by the operator from his other activities, he may use the provisions of M-46 for securing priorities assistance.

MRO Material

Q. Do the provisions relating to MRO material cover laboratory equipment?

A. Yes. Section 3 tells operators they may use and apply DO-97 to procure it.

Q. How can material be obtained in case of emergency failure, breakdown, or the like?

A. Special provisions have been set up for emergency cases. Section 5 sets out the rules. In general, the operator is required to notify PAD of the quantity of material required, what it will be used for, and the fact that there has been an actual breakdown or suspension of operations.

Q. Is PAD approval needed on orders for materials for maintenance and repair?

A. In general, and within the delivery-order values prescribed in M-46, the answer is yes if an operator is going to make use of the priorities-assistance procedures of M-46. However, for emergency requirements no delivery orders have to be filed, since approval is received directly from PAD.

Q. What is material used in administrative operations?

A. Materials used in administrative operations consist of office furniture and fixtures, office furnishings, office machines, office supplies, janitor machines, janitor supplies, and the like.

Q. To what extent may an operator apply the DO-97 rating to obtain material used in administrative operations?

A. To the extent that these materials fall within the definitions of maintenance and repair or of operating supplies. He cannot, however, purchase more of such materials than he is permitted by the quota set forth in Schedule C. If the standard or seasonal quota set forth in that schedule is inadequate, he may apply for an adjustment by filing with the Petroleum Administration for Defense.

Q. Must an operator submit copies of delivery orders covering materials used in administrative operations?

A. No, so long as the operator has a quota, either standard, seasonal or administrative. The operator must, of course, limit his purchases to the amount of his established quota.

Q. Are welding rods and electrodes considered operating supplies?

A. Yes, but only when the welding rods or electrodes are used by an operator for repair purposes on his own facilities.

Q. May an operator use the DO-97 rating to obtain welding rods and electrodes for new construction?

A. No. When used for new construction, they are not considered to be operating supplies but are considered a part of the new construction.

Q. Is it necessary to file Form PAD-26 for MRO material?

A. No. PAD 26 should be used only for large construction operations as defined in Section 10 of the order.

Q. A number of petroleum facilities built during World War II were shut down at the end of hostilities. In the intervening years, various parts and components of those plants were used by operators in other activities. May the removed parts and components be replaced by means of the DO-97 rating?

A. No. Replacement is considered a construction operation.

Q. Does the order as amended cover only oil-country tubular goods?

A. No. It makes available priorities assistance for all types of materials used in production operations. This includes not only casing, tubing, and drill pipe, but also line pipe and various fabricated items necessary either to drilling operations or to various types of lease equipment.

Q. May DO-97 be used to obtain rental material or equipment?

A. Yes, if the rental material falls within the definition of operating supplies. For example, rental of rotary drilling rigs. Other rental material equipment may not be obtained by means of the DO-97 rating.

Construction Operations

Q. For what is Form PAD-26 used?

A. It is used to get priorities assistance for large construction operations and, under M-46B, to get authority to undertake the construction operation.

Large construction operations are those on which the total cost of controlled materials is $5,000 or more, or on which $5,000 or more of all materials will be used and the operation involves a building, warehouse, office, residence, or other enclosed structure.

The use of materials for certain plants and facilities is not a construction operation but is instead a production operation. These plants or facilities are those in which the material to be installed or added will not increase the rate of capacity of the plant more than 500 hp. Thus, vacuum plants, recycling plants, plants for the extraction of natural gasoline or for other processing of natural gas will be considered as production operations if the material to be installed does not increase the rate of capacity of the plant more than 500 hp. For such facilities, Form PAD-26 does not have to be filed.

Q. Is priorities assistance available for all types of construction in the petroleum industry?

A. Yes. If it is a large construction operation, the assistance may be obtained through Form PAD-26. Otherwise, the assistance may be obtained through delivery-order filing.

Q. If approval is obtained for the facilities described in Form PAD-26, must copies of individual orders be filed?

A. No. The listing required on Form PAD-26 will be in sufficient detail to eliminate the need for filing of individual delivery orders.

Q. How do you obtain priorities assistance for operations or facilities not covered by Form PAD-26?

A. Only three types of materials are not covered by the form. These are small construction operations, all production operations, and MRO material. Priorities assistance for MRO material is obtained as specified in Sections 3, 4, and 5 of the order. Material requiring priorities assistance for production operations is obtained as specified in Sections 6, 7, 8, and 9. Section 13 sets forth the rules for getting assistance for small construction operations.

Q. After Form PAD-26 is filed, will the request be granted or denied in entirety or may it be revised by PAD?

A. PAD may revise the request, taking into account the needs of the operator, the petroleum and gas program, and the availability of materials.

Q. If a request for priorities assistance is denied, is there any appeal?

A. An operator may, of course, request a review of his application, and a review will always be granted.

Q. If authorization is granted in connection with a Form PAD-26, can it be cancelled in part or must a revised Form PAD-26 be filed?

A. The operator may always cancel a portion of his project. If he does so, he must notify PAD of the extent to which he has cancelled the project and has reduced his delivery orders for controlled materials. If operators will cooperate with PAD in promptly notifying it of these matters, more materials will be available for distribution to the industry.

Q. Is PAD approval needed before using the symbol available for small construction operations?

Map Still Available

If you need an extra copy of the Journal's multicolor wall map of Texas oil, you may obtain it by writing Reader Service Department of The Oil and Gas Journal, Box 1260, Tulsa, and enclosing $1.50.

The map, published as an insert in the June 21 issue, shows location of oil fields, gas fields, and salt domes producing oil and those producing gas. It outlines the Texas Railroad Commission district boundaries and also shows crude, products, and natural-gas lines and the location of refineries. It measures 45 by 35 in. and is suitable for framing.

A. Materials for small construction operations are obtained on delivery orders. No special form is required, but operators must follow the delivery order filing requirements of Section 15.

Miscellaneous

Q. For what types of material is delivery-order filing required?

A. In general, the delivery order filing procedures must be used in the following cases: (1) to obtain materials for maintenance and repair purposes or for use as operating supplies or to obtain laboratory equipment, (2) to obtain Class 3 material to be used in production operations, and (3) to obtain materials for small construction operations. There are also certain dollar limits which must be observed in instances where delivery order filing is required.

Q. When must delivery orders be filed?

A. Every delivery order for more than $25 worth of controlled materials must be filed for approval before the priorities assistance made available in the order can be used.

For noncontrolled materials, that is, fabricated items, every delivery order for a total amount of $5,000 or more, and every delivery order if any single item thereon costs more than $1,500, must be filed for aproval.

The order requires all delivery orders for a total amount of $500 or more to be filed, but if no single item costs more than $1,500 and if the total of all items is less than $5,000, the filing is for information purposes only.

Q. Why is the limit as low as $25?

A. Because the quantities of controlled materials available to all branches of the petroleum and gas industries are insufficient to meet the needs of the industries and must be very carefully distributed. This means that PAD must approve virtually every order for controlled materials.

Q. Why does PAD need information copies on delivery orders covering more than $500?

A. PAD must present materials requirements of the petroleum and gas industries to the Defense Production Administration. In order to develop information needed in exercising its claimant function, PAD must build up adequate data on actual orders being placed by the industry.

Q. When an operator cannot obtain prices from his supplier, how can he comply with PAD's request to show prices on all delivery orders forwarded for approval or information?

A. There are probably only a very few instances where prices cannot be obtained. In these cases the operator should ask his supplier to make the best possible estimate of the value of the material. The operator may himself estimate the value if a supplier's estimate is not forthcoming promptly, but if he does so, he should indicate this on his delivery order.

Q. Will the requirement that delivery orders must be approved result in considerable delay in issuing orders to suppliers?

A. The delivery order filing method of distributing materials was used throughout the petroleum industry in World War II. In most cases where materials are not under allocation, no appreciable delay will result. PAD has set up mechanisms whereby in most instances delivery orders can be acted upon on the day of their receipt.

Q. Tubing is listed in Schedule D as a material for which DO-97 cannot be used. Does this mean tubing such as furnace tubes for refineries and the like?

A. No. The tubing referred to in the listing is tubing used in connection with the drilling of an oil or gas well.

Q. Under M-46 an operator cannot use DO-97 for the procurement of certain chemicals. Can he use another rating?

A. Arrangements for the authorization for a rating for all chemicals under the order have not yet been completed. The order, however, provides a procedure whereby delivery orders for chemicals can be treated as a small construction operation. In the near future, a further announcement as to the methods of obtaining priorities assistance for chemicals may be made.

WATCHING WASHINGTON

Bertram F. Linz

Bright and Dim Views

There are two sides to every question, and Deputy Defense Production Administrator W. Walter Watts sees both.

On the bright side, Watts sees the controlled-materials plan assuring the defense industry its supply of critical materials for defense work and equitable distribution of the remainder among industries not in the defense effort. Few businesses will be asked to discontinue production of civilian goods entirely. However, as industries are forced to cut back civilian production, many of them will be able to devote a good part of their capacity to defense orders.

There are less encouraging factors. The most important of these, Watts concedes, is the full impact of materials shortages next year, the weight of which cannot now be estimated. This will be due, in part, to the conservation of metals, particularly those needed for stockpiling. Another problem will be that of technically trained manpower, a must not only for the proper execution of the defense program but for staffing the Government and industry in general.

CMP is designed to cope with the problem of materials shortages. Unfortunately, Watts agrees, it will not produce a single additional ton of metal. It will, however, permit a more orderly and efficient system of distribution of available metal.

Bruised Trade Act

The new reciprocal trade agreement with Venezuela will be the first to be negotiated under the revised Reciprocal Trades Act, grumblingly signed by President Truman this month.

And it is quite likely that, come a return to normal conditions, the Venezuela agreement will be the first to be attacked, for domestic independent producers long have fought the cut in the import excise tax made in 1939.

To keep within the new trade act the procedure followed by the administration will have to be stretched out. The State Department sometime this summer will publish a list of products on which duty reductions may be considered. That is the usual custom, but the next step is new—hearings by the Tariff Commission to be followed by a report on the "peril point" below which duties cannot be reduced without jeopardizing domestic industry.

The Committee for Reciprocal Information then will take over with more hearings and recommend products to be covered by negotiations. Then actual discussions can be held between United States and Venezuelan treaty makers.

The President still has the power to cut rates below the peril point, but he will have to report to Congress why. Any industry, however, which finds low-duty imports cut into its markets can apply to the Tariff Commission for relief. The commission is then required to make an investigation and issue a report.

Finally, there is an "escape clause" to be written into the agreement under which the President can improve a treaty rate or nullify a concession if found by the Tariff Commission to be injurious to domestic industry.

None of these new provisions were acceptable to the President, but he took them because a veto would kill the whole program when the State Department had just entered into comprehensive new agreements at Torquay, England.

Nationalization Jitters

Washington officials are worried over the possible spread from Iran to other Middle East countries of sentiment for nationalization.

The State Department hopes that the pattern of governmental participation in profits laid down in Venezuela and Saudi Arabia will prove sufficient to check the drift toward nationalization in the areas where American companies operate. They suggest only that companies take steps to show Arab governments the greater advantage derived from private development.

In some other governmental circles, however, a tinge of panic is apparent in the extreme suggestions that they have made. Some of these would go so far as to have the companies go through a ceremony of nationalization, if necessary, selling their facilities to the government and immediately leasing them back.

Such suggestions are definitely not in line with the thinking of the State Department, which would resist nationalization in any country where American companies operate with all the diplomatic and economic arguments it could muster.

Steel Fight

Chapman joins PAD in effort to get more steel for oil industry; says low allocation based on misconception

WASHINGTON.—A vigorous fight to get adequate materials for the oil and gas industry has been touched off by Interior Secretary Oscar L. Chapman.

Third-quarter allocations for the industry are far below the minimum necessary to carry out the expansion contemplated by the Government, Chapman told E. T. Gibson, acting head of the Defense Production Administration, in a lengthy letter.

The DPA determination, the secretary asserted, was based on two misconceptions—that the essentiality of oil and gas operations is no greater than those of any other defense-supporting industry, and that the first quarter of last year was a proper base for application of allocations.

Wrong assumptions.—Both those assumptions are incorrect, Chapman said. The first quarter of each year normally represents a low point in industry operations, because inclement weather prevents the laying of pipe lines and retards refinery and other construction in important areas of the country. The third quarter of the year is the most active. Further, he pointed out, oil and gas are vitally important to other defense-supporting industries which will pay the penalty for DPA's economy next winter.

The line-pipe allocation for the coming quarter, even if filled, will meet only 41.9 per cent of oil-line requirements and 59 per cent of gas-line needs. Approximately 635,000 tons of line pipe of larger than 4-in. diameter, less that needed for foreign operations, will be available against needs for 1,160,000 tons; 597,000 tons of pipe is needed merely to complete 20 high priority gas-line projects.

Fuel short for mills.—Unless we have an abnormally warm winter, it appears inevitable that steel mills and other defense-production plants using natural gas will be cut off from fuel during cold weather, Chapman warned.

All crude-oil pipe lines are operating near capacity, Chapman said, and there is approximately 485,000 bbl. a day of developed crude-oil productive capacity that cannot be brought to market until more pipe lines are finished. About 100,000 bbl. a day of crude oil potentially available along an unfinished crude pipe-line system leading eastward from the Rocky Mountain area cannot be utilized at all because no steel is available to finish that line in the third quarter.

Seek bigger allocation.—Chapman told Gibson the Petroleum Administration for Defense will file a formal request with the DPA program-adjustment committee for a larger allocation for the third quarter and will press vigorously for an adequate allocation for the final quarter of the year.

Figures worked up by PAD show that estimated requirements of pipe for gas transmission and distribution for the coming quarter were 878,300 tons. Actually much more is needed because of the accumulation of unfilled demands during the second quarter. Only around 517,000 tons will be available for this work under the DPA allocation. Oil transportation will get approximately 118,000 tons against needs for 282,000 tons.

Fuel-needs reports.—Anticipating the tight-supply situation which Chapman warned will occur next winter because of the niggardly allocation granted by DPA, Deputy Administrator Bruce K. Brown has requested 233 steel companies to report their natural gas and low-sulfur residual-fuel-oil requirements and their assured supplies for the last two quarters of this year and the first half of 1952.

At the same time, a questionnaire calling for information on past and estimated-future output of low-sulfur residual was sent to petroleum refiners.

Brown explained that during periods of natural-gas curtailment most steel mills which use gas shift to low-sulfur residual. PAD does not intend to attempt to obtain assured supplies of fuel for operation of the steel plants, which he said is a responsibility of the individual companies. It will, however, make an effort to assist, where possible, in the development of expanded facilities to provide fuel for steel production.

PAD DIVISION OF STEEL FOR THIRD QUARTER

	Line pipe	Oil country tubular goods	Miscellaneous shapes	Total
Production	36,600	396,800	9,000	461,800
Natural gasoline	46,800		4,000	50,800
Transmission (including terminals)	118,000		82,000	200,000
Refining	27,000		55,000	82,000
Marketing	2,000		6,000	8,000
L.P.G.	3,000		22,000	25,000
Gas transmission and distribution	517,800		15,200	533,000
Oil-field equipment manufacturers	10,000		170,000	180,000
Total domestic	779,800	396,800	363,200	1,539,800
Export to Canada	20,900	13,200	21,400	55,500
Export to other countries	58,190	40,000	115,420	213,610
Total	858,890	450,000	500,020	1,808,910

New Tax Bite?

Senate to study levies on gasoline, water transport

WASHINGTON. — The Senate will begin action this week on a House-approved tax bill which, if passed, will hit the oil industry for more revenue.

Hearings on the bill, designed to bring in $7,500,000,000 in additional taxes, will be opened by the Senate finance committee with Secretary of the Treasury John Snyder as the first witness.

Last gasp. — Snyder is expected to make a last plea for reduction of the percentage-depletion allowance turned down by the House ways and means committee. It is not expected, however, that his arguments will carry any weight with committee members who in the past have gone along with the House in the view that the present allowance is not excessive and is needed to keep exploration going.

Oil taxes.—The House bill while not changing the depletion allowance, provides for a ½-cent increase in the excise tax on gasoline to 2 cents per gallon and imposes the same tax on diesel fuel sold for use in a highway vehicle.

It carries a new levy of 3 per cent on water transportation of oil by companies using their own barges or tankers. Because such operations are not covered by tariffs, the tax would be levied on a "fair charge" based upon comparable charges by commercial transporters.

The tax would not apply to transportation within the premises of a producing property, refinery, bulk plant, terminal, or gasoline plant, nor would it affect transportation in a vessel of products to be used as fuel supplies for the ship, ship's stores, or for legitimate equipment on the vessel; transportation by and for the exclusive use of the federal or local governments; or transportation by an individual for his personal use.

Imports Tax Cut?

Venezuela, hard hit by 21-cent rate, wants cut

WASHINGTON.—Elimination of all quota restrictions on reduced-tax imports of foreign oil into the United States is sought by Venezuela through renegotiations of her reciprocal trade agreement.

The question of revising the agreement "to conform to new conditions" was raised by the Venezuelan minister of foreign relations during his recent visit.

While no public announcement has been made that oil will be a subject of discussion there would be no point to negotiations in which that commodity was ignored since it comprises 90 per cent or more of all Venezuelan trade with this country.

The agreement, entered into in 1939, provides that imports of oil up to a maximum of 5 per cent of continental refinery throughput shall be permitted entry at 50 per cent of the 21-cent a barrel excise tax. Two years later a trade agreement was negotiated with Mexico in which the quota provision was eliminated and the reduced tax rate extended to all imports. The Mexican agreement was abrogated last year, resulting in reinstitution of the quota system.

Venezuela's 1951 quota of 2,613,137,096 gal. has now probably been filled, her exports to us up to the end of May totaling 2,327,847,998 gal., so that entries for the last half of the year will have to be at the statutory tax rate. Since the government shares in the profits of the companies operating in Venezuela, the additional tax of $6,500,000 or more which Venezuelan oil will pay through the remainder of the year is a matter of considerable concern.

In the near future the State Department will announce the products which will be considered in the negotiation of a new agreement with Venezuela, and formal hearings will be held by the Tariff Commission and the Committee for Reciprocity Information to receive the views of domestic producers, importers, and exporters.

Defense Orders

WASHINGTON.—The following orders have been issued by the National Production Authority:

Amendment to M-15, June 15: Redefining zinc subject to use control.

Direction 1 to M-1, June 15: Setting July 7 as the date on which controlled materials orders will take preference over defense rated orders for iron and steel products.

Direction 1 to M-6, June 15: Instructing iron and steel producers to continue providing carbon steel products to warehouses on the basis of 85 per cent of monthly shipments during the January-September 1950 base period.

M-70, June 19: Establishing a priority rating for MRO products for ship operators, marine suppliers and ship repair yards for the third quarter.

Tanker Restrictions Sought

WASHINGTON.—Legislation restricting the transfer of American-flag vessels to foreign registry is being pressed by Sen. Warren G. Magnuson of Washington.

The measure is aimed at transfers to Panamanian registry of tankers and cargo vessels which in the past 20 years have built the Panamanian merchant fleet to the fourth largest in the world.

The major advantage of foreign registry is, of course, the lower operating cost resulting from the lower wage scales and food requirements of the foreign maritime nations, but foreign flag vessels also are free of the restrictions of any neutrality acts the United States might adopt. Much of the trade in communist China, Magnuson said, was being handled by ships carrying the Panamanian flag when he recently visited the Orient.

New CMP Symbols Issued

WASHINGTON.—The National Production Authority has issued a new series of allotment numbers and symbols to be used under the controlled materials plan in place of the DO-ratings heretofore used. It has instructed all claimant agencies, including PAD, to use them in authorizing production and construction schedules and making allotments of steel, copper, and aluminum.

The new list gives PAD the symbols H-1 for construction, H-9 for MRO under Order M-46, H-2 for other programs, and S-1 for CMP allotments. The Defense Department will use A-8 for fuels and lubricants.

MID-CONTINENT

Velma Edge Found

Sun rewarded in persistent search for formation edge

AN exception to spacing rules brought success to Sun Oil Co. last week in a rather unusual instance of search for the sharply defined producing edge of an uptilted formation.

The location was in Velma field in Stephens County, Oklahoma, where the updip edge of the Velma (Springer) sand pinches out abruptly on the southeast line of the field. Sun's 8 Robison, staked on the regular location pattern in SE NE SE 3-2s-4w, was known to be very close to the limits of the producing zone, and it missed the sand.

Company geologists prepared a cross-section of the elusive sand edge and calculated that the well had missed it by about 200 ft. Hoping to reach the pay by directional drilling, the operators made 11 whipstocking attempts without bottoming the well far enough out. Finally the well was plugged back to the shallow Deese sands and completed as a 16-bbl. pumper.

Still determined to find the edge of the Velma, Sun obtained permission from the Oklahoma Corporation Commission to drill a twin well 200 ft. north of the regular 10-acre spacing pattern. Last week the 8-A Robison hit the Velma just where company geologists had predicted, and was bottomed at 5,146 ft. after logging 136 ft. of rich Velma sand plus 68 ft. of broken Velma stringer sand below the main pay.

The spacing exception was granted because the second well did not crowd the line and like wells north and south of it were still 330 ft. from the line and 660 ft. between competitive offsets.

WEST COAST

Placerita Flurry

Morrow running seven rigs, plans to complete 100 wells

LOS ANGELES.—While not rivaling the Juanita pool development of 2 years ago, Placerita Canyon field, some 35 miles northwest of here, is undergoing a revival of drilling activity.

In Juanita pool's 60-acre "hot spot" portion alone, at times more than 40 rigs were busy in drilling the area to a density of more than two wells per acre.

The current flurry is principally made up of seven rigs being used by Tevis F. Morrow in developing the properties he acquired early in May, reportedly at a price of $6,000,000.

Since taking over the properties of Gordon Oil Co., Nelson-Phillips Oil Co. and King Oil & Gas Co., comprising some 63 wells producing about 1,500 bbl. daily, Morrow has drilled about 40 new producers.

It is anticipated a total of about 100 new wells will be drilled in developing the 400-acre leases to a 2½-acre density. Current output of the properties is about 3,800 bbl. daily.

The new development is in the low-gravity portions of the field.

Although discovered years before the Juanita area, the Morrow properties had not been developed because they produce largely 9° to 15°-gravity crude.

The new wells are being completed in 400 to 500 ft. of oil sand and range in depth from 1,000 to 2,500 ft. Initial production varies from 50 to more than 200 bbl. daily.

Gas—Hot Topic

Exports to eastern states, minimum well-head prices, and more taxes precipitate heated arguments in Texas

HOUSTON.—The subject of gas is getting hotter in Texas, the state which produces more than half the natural gas used in the nation.

Arguments have been heated on the subject of exports to eastern states, minimum prices at the well head, additional taxes on this major industry, and, less widely argued, ratable taking and proration.

A look at the gas picture in the state shows:

Gas produced in 1950 totaled 4,024.2 billion cubic feet.

Gas-production tax revenue received by the state in the first 9 months of this fiscal year totaled $10,368,393.

Twenty-six pipe-line companies are engaged in exporting gas from the state.

Of total gas not returned to the earth last year, 43.2 per cent was used outside Texas.

Commission reports. — The gas division of the Texas Railroad Commission issues a monthly report presenting vital figures on natural gas and also on plants which utilize gas as a raw material. A compilation of these monthly reports for the year 1950 reveals some interesting information on the disposition of Texas gas. (See Table 1).

The latest monthly report of the commission (for March) shows that the state's production is slightly higher than at the end of 1950 and much higher than for the corresponding month last year. In March 1950, the state produced 332.1 billion cubic feet, by December this figure had risen to 378.8, and by March of this year still further to 389.6.

Gas as raw material.—In addition to supplying the inter and intra-state transmission lines, natural gas provides raw material for 348 processing plants of various types. In March these plants consisted of the following: 190 gasoline plants, 86 pressure-maintenance and related plants, 35 cycling plants, and 37 carbon-black plants.

The production for March from the various gas-consuming plants is shown in Table 2. The daily liquid-hydrocarbon production of 318,900 bbl. compares with an average daily crude-oil production of around 2,600,000 bbl.

TABLE 1—DISPOSITION OF TEXAS NATURAL GAS FOR YEAR 1950†
(All figures in billions of cubic feet)

1. Gas returned to earth		889.9
2. Line losses and venting		28.4
3. Extraction loss	140.7	
4 Plant fuel and lease use	335.3	
5. Gas lift	142.5	
6. Carbon-black manufacture	306.4	
7. All other uses	2,181.0	
8. Total gas used (3, 4, 5, 6 and 7 combined)		3,105.9
9. Total gas produced (1, 2, and 8 combined)*		4,024.2
10. Per cent of total gas used to total gas produced	77.2	
11. Total gas used in Texas	1,764.3	
12. Per cent gas used in Texas to total gas used	56.8	
13. Total gas used outside Texas	1,341.6	
14. Per cent total gas used outside Texas to total gas used	43.2	
*Total gas produced can be broken down as follows:		
Sweet gas	2,756.5	
Sour gas	343.1	
Casinghead gas	924.6	

†Texas Railroad Commission figures.

TABLE 2—PRODUCTS FROM TEXAS PLANTS PROCESSING NATURAL GAS—MARCH

Type plant—	Gas intake (M c f.)	Condensate-crude (bbl.)	Gasoline (bbl.)	Butane-propane (bbl.)	Other products (bbl.)	Carbon black (lb.)
Gasoline	212,340,377	337,762	4,279,731	2,726,730	57,073	
Cycling	77,257,892	176,064	1,220,539	968,235	119,864	
Carbon black	27,298,356					62,657,418

Seven local geological societies on the Gulf Coast have banded together to form a new regional organization. The new body, the Gulf Coast Association of Geological Societies, has no individual memberships. Its aims include holding an annual meeting, serving as a medium through which worthwhile publications of interest to member societies may be made readily available, and, later, to apply to the American Association of Petroleum Geologists for section status. Final organization of the new group was perfected by the men shown here. Left to right are W. H. Wallace, Jr., representing the Corpus Christi Geological Society; R. W. Eaton, East Texas Geological Society; Charles DeBlieux, New Orleans; Leslie Bowling, New Orleans; A. P. Claudet, New Orleans; E. L. Earl, Houston; W. R. Farley, South Louisiana Geological Society; R. D. Sprague, Mississippi; and T. H. Philpott, Shreveport. Bowling was named permanent chairman of the new organization; Sprague was elected vice chairman; and Earl was named secretary. First meeting will be held in New Orleans November 15-17.

TABLE 3—NATURAL GAS EXPORTED FROM TEXAS IN MARCH 1951
(Thousands of cubic feet at statutory pressure base of 14.65 psi.)

Company—	Gas exported
Arkansas Louisiana Gas Co.	835,674
Border Pipe Line Co.	370,203
Canadian River Gas Co.	9,010,365
Cities Service Gas Co.	3,529,096
Consolidated Gas Utilities Corp.	29,108
El Paso Natural Gas Co.	16,215,465
Lone Star Gas Co.	125,800
Lopeno Gas Co.	6,737
Michigan-Wisconsin Pipe Line Co.	10,712,365
Natural Gas Pipeline Co. of America	13,722,107
Northern Natural Gas Co.	7,317,682
Panhandle Eastern Pipe Line Co.	10,922,176
Public Service Corp. of Texas	33,452
Reynosa Pipeline Co.	974,892
Southern Natural Gas Co.	406,873
Southern Union Gas Co.	317,008
Southwestern Public Service Co.	15,105
Spearman Gas Co.	8,907
Tennessee Gas Transmission Corp.	32,348,241
Texas Eastern Transmission Corp.	16,767,455
Texas Gas Transmission Corp.	5,554,054
Texas Gas Utilities Co.	54,990
Transcontinental Gas P. L. Corp.	7,959,669
United Gas Corp.	56,036
United Gas Pipeline Co.	5,785,578
Wheeler Gas Co.	1,200
Total	143,050,238

MIDDLE EAST

Arabian Report

Aramco tells government it worked on a railroad, fought malaria, built communities in 1950 while producing oil

ARABIAN AMERICAN OIL CO. has again made public its annual report to the Government of Saudi Arabia, covering the year 1950. The fully illustrated document, printed in both Arabic and English, is not only a record of oil operations but a review of the many unrelated activities carried on by the company.

For example, last year, Aramco continued to build a railroad for the Saudi Arabian Government, which by the end of last year had a total of 142 miles of main-line trackage. It actively carried out a program of developing the Saudi Arabian economy by cultivating independent contractors, assisting with new communities and industries, and participating in water and agricultural development.

In the letter of transmittal, W. F. Moore, Aramco president, pointed out there were two outstanding events in 1950. One was completion of the Trans-Arabian pipe line, in effect moving Arabian crude 3,000 miles closer to European markets.

The other was the supplemental agreement signed in Jeddah December 30 which resolved a number of long-standing problems.

"The new agreement increases the income of His Majesty's Government and will enable the economic development of Saudi Arabia to proceed at a more rapid pace," he said. "In addition, the agreement emphasizes the progressively increasing realization that both the government and the company have a joint economic future."

Moore said 1950 was a period of transition and adjustment in an effort to keep Saudi Arabian oil competitive with other major producing areas.

Production continued at a relatively reduced level in the first half of 1950. This was due to oversupply and excess stocks resulting from the huge postwar expansion in the industry. The situation was further influenced by controls growing out of the dollar shortage of many countries. Aramco adjusted to this problem by working out arrangements with some of the governments concerned for acceptance and utilization of nondollar currencies. Last October, the 643,147 bbl. daily production was about 100,000 bbl. daily above the earlier high of 532,282 bbl. daily in February 1949.

Among the highlights of the report itself were the following:

Production.—During the year, Aramco produced 26,196,852 tons of crude. Of the oil run from field storage, 6,078,316 tons went to Bahrein via pipe line, 5,026,535 tons went to the refinery at Ras Tanura, 13,546,563 tons went to tankers at Ras Tanura, and beginning in September, 1,234,761 tons was moved into the Trans-Arabian line.

Drilling.—Twenty-one wells were completed. Seven wells each were completed in Ain Dar and Abqaiq, one observation well in Dammam, and three each in Haradh and Qatif.

Exploration.—Operations in this phase of activity continued at a high level during 1950. The company had geological, gravity meter, reconnaissance structure drill, semidetail structure drill, marine seismograph, and triangulation and leveling parties in the field in a number of areas.

A land research and experimental seismograph party began field operations in March to determine the most advantageous drilling and operating procedures for future work. The research party worked principally in the Jabrin, Selwa, Ain Dar, and Jau Dukhan areas.

Refining.—During the year, a total of 38,364,335 bbl. of crude was used in the Ras Tanura refinery.

Production, in barrels, was as follows: gasoline 8,192,556, kerosine 2,947,219, diesel oil 10,541,888, fuel oil 13,934,281, asphalt 30,101, total 35,646,045. A new asphalt manufacturing unit was completed and went into production in August.

The output of the plant was used entirely within Saudi Arabia.

Marketing.—Details of tanker deliveries to Jeddah were completed to permit sales of Aramco products in wholesale quantities to individual wholesale purchasers.

In November construction was started on a new 4-in. refined products line from Ras Tanura to Dhahran. The principal purpose of the line is to fill railroad tank cars at Dhahran, from which point products will be carried to interior portions of Saudi Arabia.

Personnel.—In contrast to the previous 5 years when a labor force far in excess of normal operating requirements was employed to accomplish a vast construction program, 1950 presented a relatively stabilized employment picture.

Americans employed in the Aramco operations in Saudi Arabia dropped. At the end of the year, the company had a force of 17,345. Of these, 16.3 per cent were Americans, as compared to 18.5 per cent a year earlier. In December 1950, 10,767 of the total force were Saudi Arabians.

Accident prevention.—During the year, the company further reduced the accident frequency rate. The rate, referring to disabling injuries per million man-hours of work, was 10.3 in 1950, compared with 11.1 in 1949, 27.3 in 1948, and 42.2 in 1947.

Industrial training.—The year 1950 marked the first full year of operation of the company's 5-year training program started in September 1949.

A total of 2,496 Saudi Arabs were enrolled at the close of 1949, representing 24 per cent of all Saudi Arabs employed. At the end of 1950, the enrollment had risen to 4,598, or 42 per cent of all Saudi Arabs employed.

Instruction is currently offered in 144 crafts, trades, and skills required for industrial operations. Ninety Saudi Arab employes were sent to the American University at Beruit in the summers of 1949 and 1950 for special 10-week courses for clerks, instructors, and engineer aids.

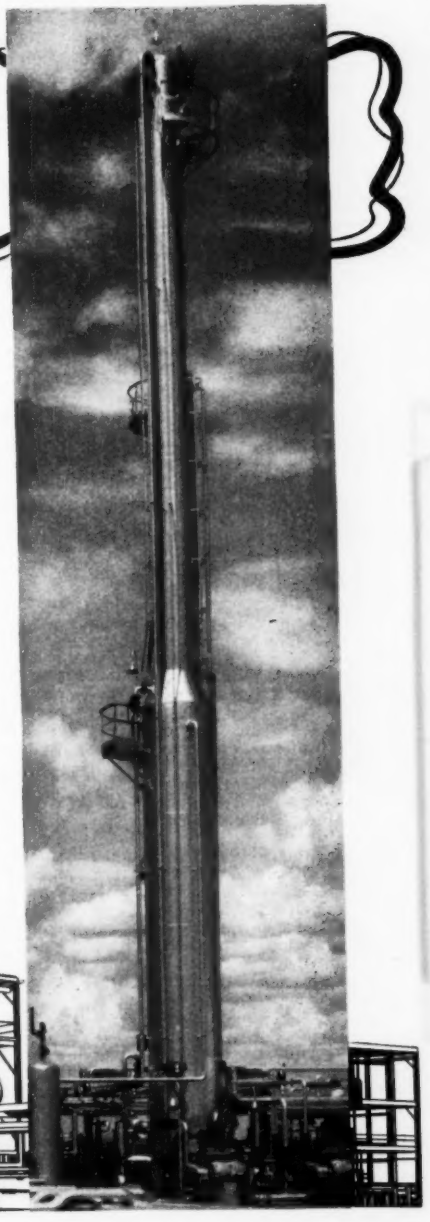
Community development.—Community developments have been laid out at locations along Tapline, and construction of houses and shops by local residents begun. In response to requests from the government, the company also was engaged in developing townsite layouts for Rahaima, 'Aqrabiyah, and Thuqba at the close of the year.

Several new industries were begun in 1950, among them a power company in Al Khobar, a power company for the district of Dhahran, an L.P.G.-distribution business in the province of Al Hasa, ice plants in Al Khobar, Dammam, Qatif, Jubail, and Hofuf, and a machine shop and garage in Hofuf.

Construction.—A total of 488 km. of additional pipe line was laid between Qatif and Qaisumah, Ain Dar, and Abqaiq, and at Buqqa, ranging from 12 to 30-in. Twenty-five flow lines from wells to separators were completed.

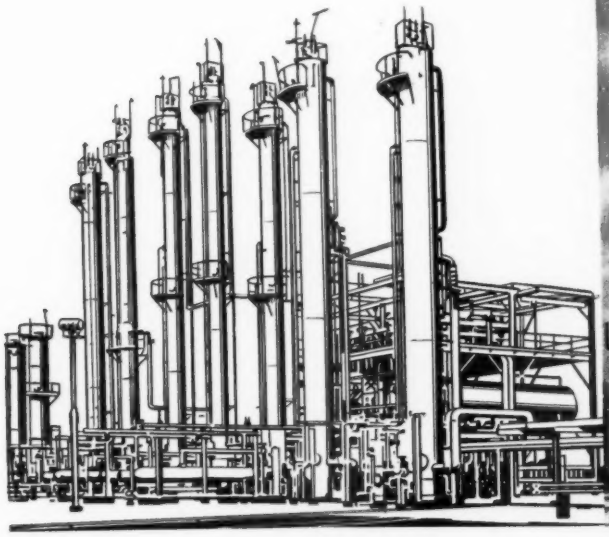
Completed projects included: an additional pump station, gas sweetening plant, and stabilizer at Abqaiq; separator plant at Ain Dar and Buqqa; 500-bbl. daily asphalt plant at Ras Tanura, pump station at Nariyah, and an offshore drilling platform. A total of 86 permanent dormitories provid-

HORTON TOWER with a *double purpose*



THIS 94-ft. Horton tower is a rich oil contactor-reabsorber recently installed at an Oklahoma refinery. In effect, it is two process columns in one. The contactor portion is the lower 6-ft. diam. section; and the reabsorber is the upper 3-ft. diam. section. The net effect of this tower's operation is to remove undesired ethane and lighter hydrocarbons from the rich oil stream and, at the same time, to scrub rejected gas from the distillation end of the plant in order to recover any propane which may have been lost.

This Horton tower is another outstanding example of special plate structures we build to meet a wide variety of pressure, temperature and vacuum conditions at petroleum plants. Write our nearest office for full details.



CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 3.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Houston, 2.....?119 National Standard Bldg.
Los Angeles, 17....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3...1615—1700 Walnut Street Bldg.
Salt Lake City, 4.....525 West 17th South St.
San Francisco, 4.....1554—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.
Washington 6, D. C.....1139 Cafritz Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprimo N.V., Amsterdam—O, Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Rio de Janeiro, Brazil

ing permanent housing space for 2,002 additional Arab employes and 28 prefabricated demountable buildings providing space for 168 Italian employes were erected.

Medical.—Two towns, Safwah and Al Ajam, were treated with DDT on a experimental basis during the year, and continued to show declining malaria rates.

During 1950, a total of 310,197 outpatient treatments were given in all Aramco clinics, of which 237,214 were Arabs. A total of 6,821 patients were hospitalized, including 4,571 Arabs. Company medical operations during the year were carried on by an average of 35 doctors, 12 of whom were American, 14 Indian, 3 Italian, and 6 Palestinian. Dental work was handled by two American and two Palestinian dentists. The company had 120 nurses on its payroll. There were 359 other hospital employes.

Government projects.—By August, the railroad line being built by the company was extended to Haradh, 200 miles west of Dammam.

Early in the year, the main wharf of the port at Dammam was opened to traffic. A new police station in Dhahran was completed. New pumping equipment was being installed at Khafs Dughrah on the Al Kharj farms which the company continued to operate as a commercial project for the benefit of the government. The company also drilled additional water wells for the government in the Nejd.

Stalemate in Iran

Future in doubt as British reject Iranian demands, Iran rejects British offer; agreement reached to replace oil

NEGOTIATIONS over the effort of the Iranian government to nationalize that country's oil industry appeared to be in complete stalemate this week.

In Teheran the Iranian government flatly rejected an operating plan proposed by Anglo-Iranian Oil Co. eyen though its acceptance had been urged by U. S. Ambassador Henry Grady, who termed it fair and reasonable.

In London the British government ordered return of the delegation which has been negotiating for a settlement in Iran.

In The Hague the International Court of Justice docketed the British request for a decision on the merits of the Iranian action and also a second request for an indication of provisional measures to preserve rights of the United Kingdom pending final decision. Hearings were scheduled to begin this week, although the Iranian government has denied that the court has jurisdiction.

In Khorramshahr, headquarters of Anglo-Iranian Oil Co. in Iran, the provisional board of directors of the new National Oil Co. of Iran directed the Anglo-Iranian general manager to hand over 75 per cent of the proceeds of the entire operations of the company, after deducting operating expenses, the remaining 25 per cent to be deposited in a bank against any future claims of Anglo-Iranian. This demand was not complied with.

In Abadan the 500,000-bbl. refinery was still operating, but tanker captains were asked to sign receipts stating that payment was to be made to Iranian National.

Replacement plans. — In Washington the Petroleum Administration for Defense and representatives of American oil companies operating abroad worked out a voluntary agreement for the emergency supply of markets normally served by Iranian oil and submitted it to the Department of Justice for antitrust clearance. The plan involves joint use of supplies, refining capacity, and transportation facilities, and is proposed to go into effect in case exports from Abadan are stopped.

Neutral sources expressed the opinion that the British offer went a long way toward meeting Iranian objectives. It accepted the principle of nationalization almost without qualification, provided funds for the Iranian government pending a permanent plan for division of the proceeds of the oil operation, and outlined a joint method of operation which would maintain activities during organization of a new corporate setup.

Rejected offer.—The British proposed to give Iran immediately a lump sum of £10,000,000 (about $28,000,000) and pay £3,000,000 monthly, beginning in July, until final arrangements were concluded.

All oil properties in Iran were to be vested in the new National Oil Co., and the properties were to be operated for the national company by a new company formed jointly by Anglo-Iranian and National Oil. Another company, entirely owned and operated by Iranians, would take over distribution of petroleum products within Iran.

The British stated that the objective of this plan was to insure that Iranian oil could still be used with profit both to Iran and to Anglo-Iranian through the world-wide organization of the company, and yet be under the actual ownership of Iran.

The Iranian government rejected this proposal after only a half-hour deliberation, stating that it failed to conform to the terms of the nationalization law.

In reporting the deadlock to Parliament last week, Foreign Secretary Herbert Morrison said that even if the proposals were not consistent with the letter of the nationalization law, they were consistent with the principle of nationalization and would undoubtedly fit in with a liberal interpretation of the law. He added that the company could not agree to the Iranian demand to turn over 75 per cent of all proceeds of its world-wide operations and put the balance in escrow, and that the negotiating delegation had been instructed to return to London.

Iran offers exports. — Early this week advertisements were placed in American and European petroleum and financial papers by Iranian embassies on behalf of National Oil Co. of Iran, and stating:

"All purchasers of petroleum products from Iran for export are hereby notified that they can within 1 month from the date of this notice obtain delivery of the oil products they require against receipt but they must refer to the board of directors within 1 month of the date of this notice and effect payment at the standard international rates.

"After the expiry of the above period of 1 month, the sale prices shall be at the standard international rates for quantities which customers of the former A.I.O.C. have purchased during the period between January 1, 1948, and March 20, 1951. For any quantities exceeding these, they shall have priority in purchasing, other terms and conditions being equal."

These advertisements were interpreted as indicating that the new National Oil Co. intends to take over all export business of Anglo-Iranian, but so far as could be learned this week no sales had been made on this basis.

Personnel problem.—The prime question this week appeared to be the fate of the 3,000 to 4,000 British nationals who are the key technical and administrative employes of Anglo-Iranian. The British government has stated that it will protect or evacuate them in case they are endangered by riots or the inability of the Iranian government to maintain order. On the other hand, the Iranian government has asked all these employes to remain and to consider themselves employes of the National Oil Co.

It is considered highly unlikely that the Iranians could long operate the company without the assistance of nonnationals, but the British probably would not withdraw their people except as a last resort because both the refinery and the oil fields could be severely damaged if operated without the engineers and technicians familiar with them.

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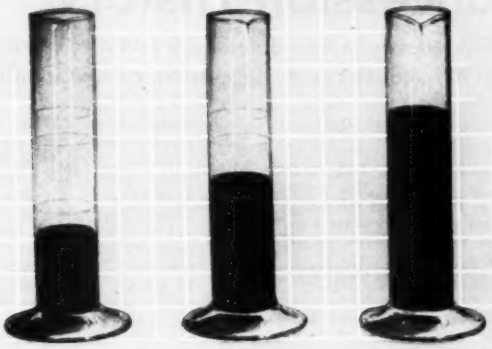

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NOTICE: Visco Products Company is authorized to manufacture and sell Visco Oil Treating Compounds for use in the breaking and resolving of oil emulsions, or to grant licenses for such use, under the following United States Letters Patent: 2,050,629; 2,060,640; 2,206,589; 2,214,783; 2,214,784; 2,295,788; 2,300,414; 2,307,815; 2,318,004; 2,318,035; 2,322,066; 2,335,354; 2,464,809; 2,514,399. Visco Products Company is willing to grant licenses on a royalty basis, to oil companies, and to others desiring to practice the patented subject matter, under any and all of the above Letters Patent, permitting the user to purchase the oil treating compounds at will from any vendor, or to prepare the compounds for use or to use the compounds under the above Letters Patent. Application for license should be made to: **Visco Products Company,** Houston, Texas.

Concession History

Oil industry in Iran dates back to 1901, when Persia gave D'Arcy country-wide concession; oil first found in 1908

Dahl M. Duff

THE present concession of Anglo-Iranian Oil Co., Ltd., in Iran dates back to 1933, but the company was born at the turn of the century when William K. D'Arcy staked his fortune on the chance of finding oil in the country.

Aside from the current issues which have led to expropriation action by the Iranian Government, the story of the early efforts of D'Arcy and his associates in Iran is one of the most interesting chapters in the history of the oil industry outside the United States.

D'Arcy was an Englishman who had made a fortune in Australia. While in England he read a memorandum on oil seepages in western Iran which had been written by the French geologist and archeologist, de Morgan.

1901 Concession.—Early in 1901, D'Arcy's representatives in Teheran negotiated a concession covering the entire Persian Empire with the exception of five northern provinces. By December of the following year, equipment had been moved across the wasteland and drilling commenced at Chiah Surkh, some 300 miles northwest of the head of the Persian Gulf and near the present Naft-i-Shah field.

The hole was abandoned 18 months later after oil was found in noncommercial quantities. D'Arcy took in partners, raised additional capital, and resumed drilling in southwestern Iran near the present Haft Kel field. Again, operations failed.

First strike.—The next try was Maidan-i-Naftun where a major discovery was made May 26, 1908, approximately 7 years after the concession was granted. Funds were nearly exhausted when the well came in. This original field was renamed Masjid-i-Sulaiman in 1926 after a Persian fire temple in the area. Up to the middle of last year, the field had an accumulative production of nearly 850,000,000 bbl.

In the years following the Maidan-i-Naftun discovery, Anglo-Iranian found eight other fields — seven of them located along an approximate northwest-southeast line in the foothills of the Zagros Mountains.

Abadan origin.—The Abadan refinery, which the Iranian Government now proposes to operate, first took shape in the winter of 1909-10. It was completed in 1912, and subsequent additions have made it the world's largest single processing installation with a throughput of some 540,000 bbl. daily.

Government interest. — The British Government's interest in Anglo-Iranian was taken in May 1912 at a time when the British Navy under the leadership of Winston Churchill was converting from coal to oil fuel. The Admiralty entered into a long-term contract for fuel oil from Anglo-Iranian and at the same time invested £2,000,000 in the company. This interest now gives the British Government 56 per cent of company capital and allows it to exercise 52.55 per cent of the voting rights.

The government interest has been an added irritant to the Iranians. The British Government receives income from the company both in taxes and dividends, and the Iranians feel that the British Government gets more from the enterprise than does Iran itself through royalties and other payments.

During World War I, Turkish forces threatened the concession area. British troops landed on what was then Turkish territory and saved Abadan. Hostile tribesmen, however, cut the company's pipe line near Ahwaz and operations were suspended for 3 months.

Concession canceled. — The original D'Arcy concession was canceled by the Iranian Government in a dispute over its revision in 1933. Protesting this action, the company prepared to take its case to the World Court and had briefs assembled to present its case. Subsequently, however, a new agreement was reached under which the size of the concession was limited to 100,000 sq. miles and royalty placed on a tonnage basis.

Anglo-Iranian was the first oil company in the Middle East and had been producing there more than 16 years when Kirkuk field was discovered in Iraq in 1927. Anglo-Iranian's greatest expansion, however, has come since the beginning of the last war. Output has been increased from approximately 214,000 to more than 700,000 bbl. daily since 1939.

Anglo-Iranian shares with Creole Petroleum Corp. in Venezuela the title of the world's largest producing company. In February, Creole's operated production was 693,752 bbl. daily; Anglo-Iranian, 704,600 bbl. daily; Arabian American Oil Co., 633,718 bbl. daily.

Non-Iranian interests. — The British company has other important interests in the Middle East and if its non-Iranian properties are considered, its total production is considerably above that of Creole. Of these other holdings, most important is the half share of Kuwait Oil Co., Ltd., now producing at a reported rate of some 500,000 bbl. daily. This company will undoubtedly be called on to supply a large part of any crude deficit resulting from nationalization in Iran. Anglo-Iranian also holds 23.75 per cent of Iraq Petroleum Co., Ltd., which produces in Qatar and Iraq.

Crude reserves.—Anglo-Iranian's crude-oil reserves in Iran have been unofficially estimated at 7,000,000,000 bbl. and up. A statement of the Interior Department's Oil and Gas Division gave a figure of 13,000,000,000 bbl. as of the end of 1949.

The company's aboveground physical properties have been estimated to be worth well over a billion dollars—a sum completely beyond the capabilities of Iran's nearly bankrupt economy to pay, if the country is to proceed by rules of international law. These call for prompt, as well as adequate, compensation in the event of expropriation.

Efficiency.—Most American oil men who have visited Abadan and Anglo-Iranian's field operations in the last few years have come away amazed at the magnitude of the enterprise and its smooth and efficient administrative and technical machinery.

Politically, the nationalization issue raises a tough problem for the United States and Britain in their worldwide struggle to contain communism. If the British are forced out and the properties begin to deteriorate, should the United States provide technical and financial assistance in order to keep Iran from turning to Russia?

EUROPE

Circular Line Under Way

A project unique in pipe-line engineering is under construction from Le Havre to Paris, France.

The line has been designed to go through the suburbs of Paris serving distribution points along a semicircular route around the city. This is the first time a metropolitan area will be served by a products pipe line which almost surrounds it.

The project consists of 140 miles of 10-in. being laid by a group of the principal French pipe-line contractors for Societe Des Transports Petroliers Par Pipe-Line. This company is a successor to Cie. des Pipe Lines Petroliers Francais for which a project was designed by Floyd E. Warterfield, Jr., Dallas, Tex.

The new pipe-line system will have three pump stations located near the Basse-Seine Valley refineries from which it will be supplied. These refineries are owned and located as follows:

1. Compagnie Francaise de Raffinage, at Gonfreville.

2. Standard Francaise des Petroles and Socony-Vacumm Francaise, at Port-Jerome.

3. Shell Francaise, at Petit-Couronne.

The owners of the pipeline company include the French Government which has shares amounting to 310 million francs; the Harbor of Le Havre, 55 million francs; and the French oil companies, 525 million francs. Total capital stock is now 890 million francs. The company operates from headquarters at 68 Boulevard Malesherbes, Paris.

Polystyrene Plant Operating

A new British polystyrene plant is now in full operation at Partington near Manchester. Designed and constructed by Petrocarbon, Ltd., it is owned and operated by Styrene Products, Ltd., a company formed jointly by Petrochemicals and Erinoid, Ltd., last year.

The polystyrene plant covers an area of approximately five acres and is capable of producing 5,000 to 6,000 tons of this chemical annually. The starting material is monomeric styrene which will eventually be manufactured by Styrene Products, Ltd., from raw materials furnished by the adjoining petroleum chemicals plant of Petrochemicals, Ltd. In the meantime, imported monomer is being used.

The plant is considered to be one of the most modern and efficient in the world. All buildings are sealed and air-conditioned. High standards of operation are maintained by fully automatic control at all stages to ensure absolute purity of product. Technical research will be conducted by the staffs of Petrocarbon, Ltd., and Erinoid, Ltd. The polystyrene is marketed under the trade name of Erinoid in the molding powder, sheet, and rod form.

FAR EAST

Sumatra Refinery Planned

Development of production in central Sumatra by a joint affiliate of Standard Oil Co. of California and The Texas Co. will involve construction of new refining capacity in that area, according to R. G. Follis, chairman of Standard of California's board.

Follis, who with other company officials recently returned from an around-the-world inspection trip, said in a stockholders' report, that results of the Indonesian operation *(The Oil and Gas Journal, May 24, page 91)* would alter Caltex distribution materially in the Far East, and that the production together with new refining capacity, would effect substantial savings in tanker transportation.

The new source of Indonesian oil will relieve the dependence of the Far East upon Persian Gulf production.

LATIN AMERICA

Labor Agreement Signed

MEXICO CITY. — A 2-year labor contract covering the entire Mexican oil industry has been signed and is now in effect.

The contract granted gains to workers in the form of social benefits but did not increase salaries. The new arrangement, expected to cost Petroleos Mexicanos an additional $10,000,000 annually, provides for improved housing, added medical attention, savings funds, commissaries, and similar benefits. The contract expires in June 1953.

Chile Renews Crude-Oil Deal

The contract under which Chile sells its Tierra del Fuego production to the Uruguayan Government organization, ANCAP, has been renewed, to run until September 1953.

The new 2-year contract covers the shipment of about $5,000,000 worth of oil. It takes effect this September on completion of the shipment of about $3,400,000 of crude oil under the January 1950 contract.

The Chilean oil agency, Empresa Nacional de Petroleo, has ultimate plans for the construction of a refinery in Chile, but the new contract indicates it will not be completed in the next 2½ years.

Oil-Meat Swap Accepted

Undisclosed amounts of petroleum and products along with coal are to be supplied by Britain under a new trade agreement with Uruguay.

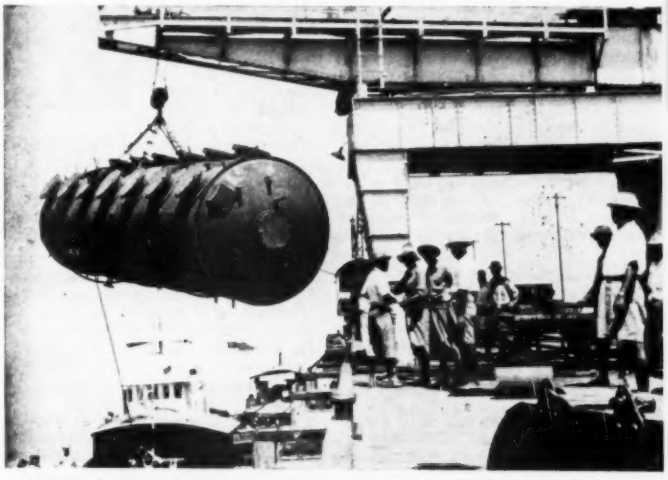
The agreement signed recently in Montevideo after 5 weeks of negotiations will give Britain 40,000 tons of frozen and chilled meat during the next 12 months.

About a month ago Britain reached a new trade agreement with Argentina to furnish petroleum at a rate of some 80,000 bbl. daily, mainly crude and fuel oil. A large part of this is moved from Iran and the Abadan refinery.

International Briefs

Foster Wheeler Corp. has been named as general contractor for the new refinery to be built by the Standard-Vacuum Oil Co. organization at Durban in the Union of South Africa. An advance party of construction engineers from Foster Wheeler's New York headquarters is scheduled to arrive in Durban in the next few weeks to begin field-survey work. The 10,000-bbl. refinery will be operated by the new affiliate, Standard-Vacuum Refining Co. of South Africa (Pty.) Ltd.

Capital of an Egyptian fertilizer company has been increased by 1,600,000 Egyptian pounds in order to provide funds for the construction of a natural-gas pipe line from Shell's Ras Gharib field to Suez. The fertilizer plant at Suez, partly financed by a $7,300,000 Export-Import Bank loan, is now nearing completion and will have an initial capacity of 250,000 tons a year. The company is Soc. d'Engrais et d'Industries Chimiques.



REFINERY ON THE WAY.—A 30-ft. section of a distillation tower is shown being loaded on a barge at Rangoon for a trip up the Irawaddy River. Burmah Oil Co. is expanding its refining facilities in Chauk field, 350 miles north of Rangoon, where this new piece of equipment will be put into operation.

New President

Brandli named head of Cities Service Oil (Pa.)

H. E. BRANDLI of New York City has been elected president of Cities Service Oil Co. (Pa.) by the board of directors. He succeeds Burl S. Watson, who recently was made chairman of the executive committee.

Brandli is a former vice president and general manager of the company, and is a veteran Cities Service executive. During nearly 40 years with the organization he has engaged in all phases of its widespread interests. His activities have included key managerial positions with properties of the organization in Illinois, Texas, Kansas, Mississippi, and Alabama.

Brandli was appointed general manager of Cities Service (Pa.) in 1947. Until he was named to this post, he was vice president in charge of export and wholesale sales and was in charge of Cities Service Export Oil Co. in New York.

Joining Cities Service in 1912, for the first 8 years he was manager of various utility properties.

Harry A. Heiss has been appointed manager of Pan-Am Southern Corp.'s Destrehan, La., refinery. He formerly was general foreman of the light-oils division at Standard Oil Co. (Ind.), where he supervised operation of catalytic cracking units.

Charles E. Decker has been retired from the department of geology at University of Oklahoma, Norman. He will continue his research on Cambrian graptolite. Decker, who began teaching geology at the university in 1916, was secretary-treasurer of A.A.P.G. from 1919-26.

J. R. Ramirez, design engineer for Union Oil Co. of California, has been transferred from Santa Ana to Wilmington, Calif.

Donald D. Engle, district engineer for Midstates Oil Corp., has been transferred from Longview, Tex., to Haynesville, La.

John J. Rupnik has resigned as geophysicist with Sinclair Oil & Gas Co. and has become associated with the consulting firm of Manhart, Millison, & Beebe, Tulsa. After graduation from Colorado School of Mines in 1933, he joined The Texas Co.'s geophysical department. Since then he has also been associated with United Geophysical Co., Sun Oil Co., and Sinclair.

Ross Buchanan, office manager at Flora, Ill., for Henson Drilling Co., has been transferred to Abilene, Tex., in the same capacity.

Donald D. Lloyd, formerly a student at University of Southern California, has joined Formation Logging Service Co., Bakersfield, Calif., as a petroleum engineer.

J. M. Lebeaux, assistant professor of petroleum engineering at University of Texas, has joined Stanolind Oil & Gas Co. for the summer period as petroleum engineer at Andrews, Tex.

H. M. Cosgrove, executive secretary of Purchasing Agents Association of Tulsa, and editor of the Mid-Continent Purchaser, received the J. Shipman gold medal at the recent association convention in New York City for his "modest, unselfish, sincere, and persistent efforts for the advancement of purchasing, and for his able assistance and guidance to purchasing agents in their endeavors."

Paul H. Smith, construction superintendent for Refinery Engineering Co., Tulsa, is now in charge of construction of a refinery for Lake Superior Refining Co. at Superior, Wis. He formerly was in charge of construction on a project for The Texas Co. at Lockport, Ill.

John R. Beverly has been appointed a member of the management committee of International Petroleum Co., Ltd., Lima, Peru. Other changes include: **Ivor H. Hughes,** appointed division manager at Talara, replacing **H. C. Carroll,** who is now in Lima as a member of the management committee; and **Max Crawford,** formerly of I.P.C. Venezuela, appointed assistant division manager at Talara.

P. W. Parker, chairman of the board of directors of Standard-Vacuum Oil Co., has been elected president of the company in an organizational change which designates the president as the chief executive officer of the firm. Other changes in the New York management group include: **L. V. Collings,** general counsel, named chairman of the board replacing Parker;

E. N. LEIBACHER

GEORGE F. JAMES

H. W. McCobb, a director, elected a vice president of the company; **Edward N. Leibacher** and **George F. James,** elected directors to fill the vacancy created when **L. W. Elliott,** former president, recently became a director of Standard Oil Co. (N. J.) and a new position was set up on the board of directors, increasing members from 9 to 10; **Harold Midtbo,** named treasurer replacing James, and **H. F. Prioleau,** named vice chairman of the newly formed executive committee, which is headed by Parker. Leibacher entered the oil industry in 1916 as an engineer at Esso's Bayway refinery, Linden, N. J. He served in Sumatra for a time before joining Standard-Vacuum's New York staff in 1933. James, who served as treasurer of the firm for the past 2 years, practiced law and taught at University of Chicago before joining the company in 1944.

Daniel C. Hodges, Tulsa, has joined the engineering department of Interstate Oil Pipe Line Co., Shreveport.

Ralph Arnold, pioneer petroleum geologist has donated to Henry H. Huntington Library and Arts Gallery at Owensboro, Ky., his correspondence and business and professional records covering more than 50 years of work in the western United States, Canada, Venezuela, Cuba, Trinidad, and Mexico.

William H. Barber has been made technical assistant to the head of the utilities and service division, Esso Standard Oil Co. refinery at Bayonne, N. J. At the same plant, **T. R. Harlan** has been promoted to foreman in the pipe-fitting department.

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FIELD PROVEN

PERSONALS

Burt E. Hull, vice president of The Texas Co. and former president of Trans-Arabian Pipe Line Co., has retired after 46 years in the oil business. Widely known in the oil and pipe-line industries, Hull was first employed by Texaco in 1905 as a junior engineer and draftsman. Among his more recent engineering achievements was the giant 1,068-mile Tapline from the oil fields of Saudi Arabia to Sidon, Lebanon, on the Mediterranean coast. During World War II he was vice president and general manager of War Emergency Pipe Lines, Inc., which constructed the Big Inch and Little Inch pipe lines from Texas to the East Coast. Hull's successor at Texaco has not yet been named.

Harry Thompson, division geologist for Shell Oil Co., Denver, has taken up his new duties as area geologist in Tulsa. He is succeeded in Denver by **J. W. McDonald,** formerly division geologist at Wichita Falls, Tex.

Edward J. Kennelly, division manager at Downington, Pa., for Texas Eastern Transmission Corp., has been named manager of the company's newly formed Division 5, which embraces the area from Kosciusko, Miss., to the northern Kentucky boundary, and will be headquartered at Lebanon, Tenn. Other changes include: **William Falleaf,** formerly assistant manager of Division 4 at Baytown, Tex., named assistant division manager at Lebanon; **Paul L. Hughen,** division manager at Baytown, named to replace Kennelly as manager of Division 3 at Downington; **William C. Britt,** former assistant division manager at North Little Rock, Ark., moved to Baytown as division manager; **Earl Humble,** division engineer, named assistant division manager at Baytown, and **Robert S. Cooper,** division engineer at North Little Rock, named assistant division manager.

C. C. Hogg has been named training director of Sohio Petroleum Co. at Oklahoma City. He is a graduate mechanical engineer from Cornell University, and formerly was vice president and general manager of National Petroleum Co. and Patoil Corp.

Charles M. Reid, Jr., drilling engineer for Carter Oil Co. at Oklahoma City, has been transferred to Vernal, Utah, as drilling and production engineer.

William L. Ainsworth, of Ainsworth Brothers, Wichita, has been elected chairman of the Kansas Petroleum Industries Committee. Others named include: **J. B. Smith,** vice president, Vickers Petroleum Co., vice chairman; and **C. E. Holmes,** reelected executive secretary.

SERVICE AWARDS.—A. W. Peake, president, and Frank O. Prior, executive vice president, Standard Oil Co. (Ind.) are presented service pins by Dr. Robert E. Wilson, chairman, in recognition of 30 years of service with the company. Dr. Wilson, at left, pins the service emblem on Prior as Peake looks on. Both Peake and Prior joined the oil industry as roustabouts.

William L. Robbins, junior engineer for Carter Oil Co. at Tulsa, has been transferred to Great Bend, Kans., in that capacity.

Carl L. Whigham, Jr., petroleum engineer for The Texas Co. at Shreveport, has been transferred to Houma, La., in the same capacity.

SHELL EXPLORATION MEETING.—Above are members of Shell Oil Co.'s exploration staff who met in Tulsa last week for the annual midyear meeting. Seated, left to right: H. M. Fritts, exploration manager, Midland, Tex.; H. Gershinowitz, director of research and technical services, Houston; M. S. Metz, exploration manager, Calgary, Alta., Canada; H. L. Koch, area geologist, Calgary; L. Schepers, visitor, exploration and production department, The Hague, the Netherlands; J. T. Dickerson, area manager, Midland; E. D. Cumming, vice president, Houston; L. G. Christie, senior geologist, head office, New York City; A. J. Galloway, vice president, exploration and production, New York City; Sam F. Bowlby, vice president, Los Angeles; O. Wilhelm, regional production geologist, Houston; F. W. Oudt, exploration manager, New Orleans; and L. R. Newfarmer, exploration manager, Los Angeles. Standing, left to right: W. A. Alexander, area manager, Tulsa; E. G. Robinson, vice president, Shell of Canada, Calgary; S. Buckstaff, exploration manager, Houston; R. E. McAdams, exploration manager, Tulsa; B. Dykstra, area manager, New Orleans; F. Goldstone, regional geophysicist, Houston; and M. King Hubbert, associate director of exploration research, Houston.

PERSONALS

A.A.P.G. EXECUTIVE COMMITTEE MEETS.—Members of the executive committee of the American Association of Petroleum Geologists met in Tulsa June 22-23. Left to right: Kenneth K. Landes, editor of the A.A.P.G. Bulletin, Department of Geology, University of Michigan, Ann Arbor; Lewis G. Weeks, vice president of A.A.P.G., chief research geologist for Standard Oil Co. (N.J.), New York City; Frank A. Morgan, president of A.A.P.G., vice president and manager of exploration for Richfield Oil Corp., Los Angeles; Clarence L. Moody, past president of A.A.P.G., and division geologist for Ohio Oil Co., Shreveport; and Robert H. Dott, secretary-treasurer of A.A.P.G., director of the Oklahoma Geological Survey, Norman.

G. LAWRENCE

Grove Lawrence has been elected vice president of Southern California Gas Co., to succeed **William Moeller, Jr.,** who retires July 1. Lawrence is a graduate of Stanford University and has been with the company since 1925. He served as an engineer in Taft, Ventura, and Newhall, Calif., for 10 years and in 1938 was made superintendent of transmission at Taft. In 1943 he moved to Los Angeles as manager of the compression and storage department. He later served as manager of the butadiene-production department, and following the war was made assistant vice president.

Harry H. Johnson, president of Algonquin Gas Transmission Co., Boston, has been appointed a member of the gas-industry advisory council by **Oscar L. Chapman,** secretary of the interior.

E. G. Baker, Service Pipe Line Co. supervisor, Tulsa, has been named assistant chief of the transportation-materials branch of Petroleum Administration for Defense.

Hubert E. Bale, Oklahoma City independent geologist and engineer, has been named president of Texas Consolidated Oil Co., Dallas, succeeding **A. W. Kincade,** Wichita, who resigned last week. Also resigning from the company were **Allen E. Freeze,** vice president, and **Morris Porter,** secretary-treasurer.

J. W. Wilson has been named superintendent of operations, and **M. F. Wirges,** chief process engineer for the gasoline - chemical division of Cities Service Oil Co. (Del.). They will work under direct supervision of **Ralph W. Johnston** and **Harry P. Hohenadel,** general superintendents of the gasoline and chemical divisions, respectively.

Fred H. Moore has been appointed assistant to the president of Magnolia Petroleum Co., Dallas. He joined Magnolia in 1935 as a field geologist in Oklahoma, and a year later was transferred to Midland, Tex., where he served 4 years as a geologist. After working in the Kansas, Ohio, North Texas, and Illinois geological districts, he was sent to Roswell, N. M., to open Magnolia's geological offices there in 1947. Two years later he was moved to the general offices in Dallas as staff geologist, and in March 1950 was assigned staff duties in the executive offices. He is a member of the Geological Society of America, American Association of Petroleum Geologists, American Geophysical Union, and Texas Academy of Science.

Noble C. Ginther and **Curtis Hankamer,** Houston independent oil operators, have been named directors of the Houston Bank & Trust Co.

H. G. A. Quarles van Ufford, of The Hague, the Netherlands, general proxy for N. V. de Bataafsche Petroleum Maatschappij (Royal Dutch-Shell Group), this week was in London to superintend the launching of a new large-capacity ocean tanker for Shell. He just completed a prominent part in the Third World Petroleum Congress, serving as a member of both the organizing and of the press and publicity committees. Van Ufford commenced his career with Royal Dutch-Shell in 1919. In 1920-1925 he served in oil-production work at Batavia and Balikpapan, in 1926 in London. Then later he returned to the Netherlands East Indies. In 1932, Van Ufford was made manager of Shell's Venezuelan companies and later was in the United States at Los Angeles and San Francisco.

DEATHS

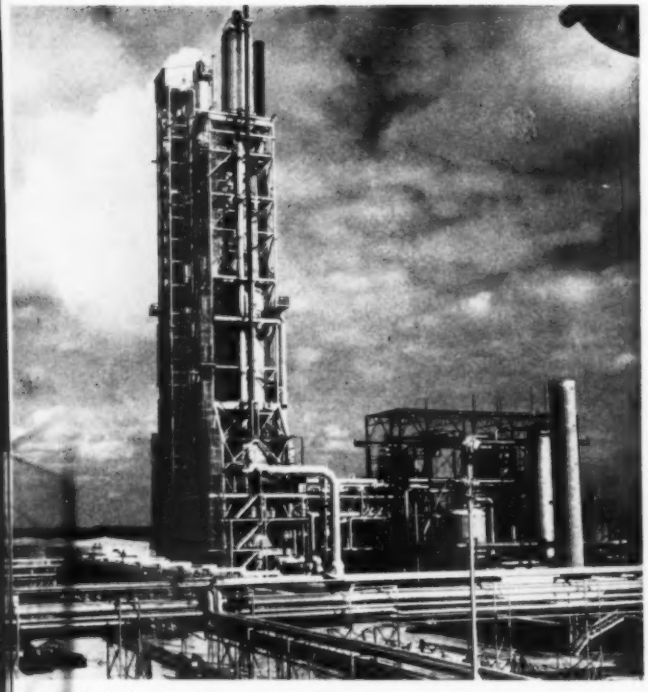
John J. Ohern, 64, Texas oil man who was an original partner in Skelly Oil Co., died in Laredo, Tex., June 19. He formed United Gulf Gas Co., now United Gas Corp., and was a director of the Mid-Continent Oil and Gas Association from the time the group was organized.

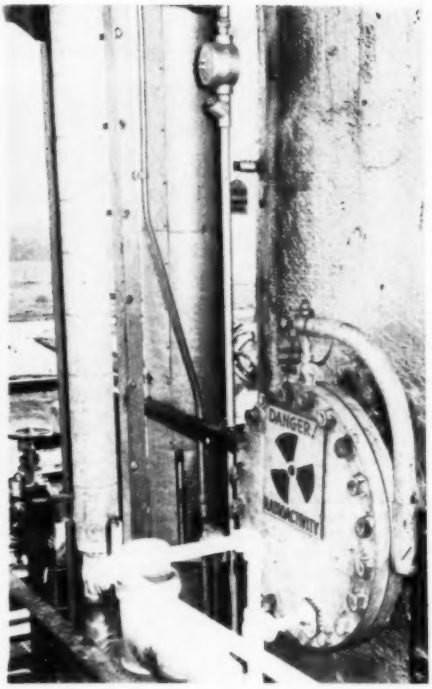
John L. Cummings, 61, consultant for Panhandle Eastern Pipe Line Co., died in Liberal, Kans., June 21. He served as inspector of pipe-line construction for Panhandle when its first big lines were put in service, and prior to that he had been a superintendent for Michigan Gas Transmission Co.

James B. Morrison, 75, Tulsa, independent oil operator, died in West Chester, Pa., June 19. He had been a partner with the late George C. Probst in Doris Oil Co.

Hugh G. Humphreys, 79, Tulsa, veteran oil accountant formerly with Sinclair Oil Co., Skelly Oil Co., and later treasurer of British-American Oil Co., died June 24.

Albert Harrison Hinkle, 71, division engineer for Asphalt Institute, Columbus, Ohio, died June 8 in Columbus.





Left: The first of three modified Thermofor cat crackers to go on stream at Magnolia's Beaumont refinery was this twin unit. Right: Each of three air-lift T.C.C. units is equipped with gamma-ray liquid-level indicators.

Magnolia's Beaumont T.C.C. Units Employ

Catalyst Air-Lift System

Developed by Socony-Vacuum Oil Co., Inc.

by F. Lawrence Resen
Gulf Coast District Editor

THE modified, air-lift Thermofor catalytic cracking units now on stream at Magnolia Petroleum Co.'s 150,000-bbl. refinery at Beaumont are the first T.C.C. units to incorporate an air lift for the catalyst. A development of Socony-Vacuum Oil Co., Inc., the units are the first of 28 being built which will have a combined throughput capacity of 325,000-350,000 bbl. per day.

Three of the 28 units are located at the Beaumont refinery where they have increased the output of high-octane gasoline by 50 per cent. Each air-lift unit has a daily throughput capacity of 15,000 bbl. compared to the 10,000-bbl. Houdry units which they have replaced.

The simplified design and the efficiency of the new units are expected to effect substantial reductions in investment and operating costs. Various operating features of the equipment will increase the flexibility of the refinery.

The air-lift T.C.C. unit combines simplicity with flexibility to process a wider range of stock than the earlier type units. The process is capable of handling the heaviest stock now being charged to any catalytic cracking units. The new T.C.C. unit can be operated at varying severities and for yield at various products as dictated by refinery production schedules. The air-lift cracker retains all of the basic advantages of high liquid recovery, high catalyst activity, high cracking efficiency, and high gasoline-to-coke ratio associated with previous T.C.C. operations.

Catalyst Flow

The catalyst makes a continuous cycle through the unit, first going from kiln or regenerator to air lift to cracking chamber where it contacts oil vapors. It then passes to the catalyst regenerator, completing the cycle.

Catalyst lift.—Regenerated catalyst flows by gravity from the kiln to a lift pot. Air at about 2-psig. pressure picks up the catalyst at this point and lifts it to the top of the unit where it is collected in a separator-surge hopper. Circulation of the catalyst may easily be controlled at any rate below maximum and the lifts may be designed to convey catalyst at the desired rates.

Seal leg.—At the top of the unit is located a separator-surge hopper, where the catalyst collects after leaving the lift. From here catalyst flows by gravity through a seal leg and on to the reactor. Pressure in the top of the reactor varies from 7 to 13 psig. depending on operating conditions; steam or flue gas flows countercurrent to the descending catalyst in a seal leg. This makes possible movement of the catalyst from a zone of atmospheric pressure (the separator-surge hopper) to a zone of higher pressure (the reactor). As the catalyst is discharged from the seal leg into the reactor it is distributed in such a manner as to avoid segregation of fine and large particles and to maintain a catalyst bed of uniform depth throughout the reactor.

A small stream of catalyst is withdrawn from the separator-surge hopper (usually about 1½ per cent of circulation) and passed through an elutriator where the freely falling stream of catalyst is dropped through an ascending stream of flue gas of controlled velocity. This secondary catalyst circuit is used to remove fine particles from the system.

Cracking Chamber

Reaction takes place in the cracking chamber where the catalyst is exposed to incoming uncracked oil. The spent catalyst passes on into the regenerator and the cracked oil vapors are taken off for further processing.

Reactor.—Oil in the form of vapor is introduced through the side of the reactor above the top of the bed and liquid oil as a separate stream may enter through a nozzle suspended from the head of the reactor. Uniform mixing of the catalyst and oil is obtained at the top of the catalyst bed. As the catalyst passes down through a series of oil-vapor collecting grids the cracked oil vapors are disengaged from the catalyst. Catalyst-collecting devices are provided under the disengager to insure uniform cross-sectional flow of catalyst.

Purge steam is introduced into the catalyst stream below the point of oil-vapor disengagement. Countercurrent flow of the stream insures substantially complete removal of entrained vapors and adsorbed oil from the catalyst before it passes into the regenerator. Failure to strip the oil at this point results in wasted hydrocarbons and increases the burning load on the kiln.

Before the catalyst may be reused

(Continued on page 91)

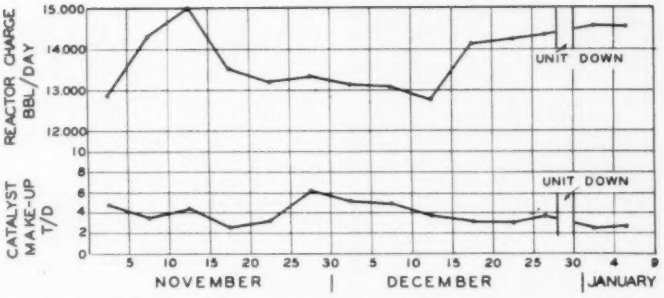


Fig. 2.—Reactor charge and catalyst makeup vs. time, T.C.C. unit No. 2, Beaumont refinery.

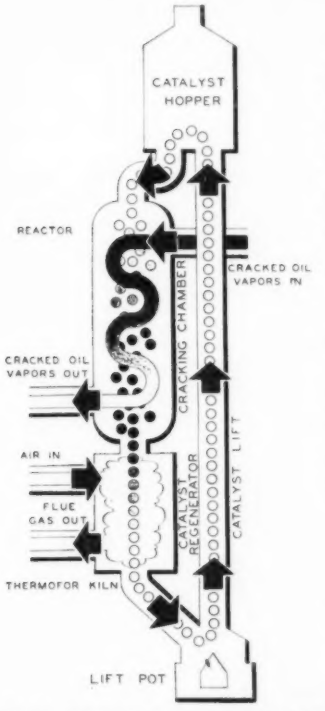


Fig. 1.—Schematic flow arrangement of the modified Thermofor crackers at Magnolia's Beaumont plant.

TABLE 1

Operating conditions—	1,000 lb./hr.	B.P.S.D.
Charge to tar separator	219.0	17,000
Tar separator bottoms	34.1	2,590
Tar separator overhead (reactor charge)	184.6	14,400
Average reactor pressure, psig.	10	
Oil vapors to reactor, °F.	765	
Catalyst to reactor, °F.	900	
Steam in reactor charge, weight per cent	2.5	
Carbon on spent catalyst, weight per cent	1.12	
Carbon on regen. catalyst, weight per cent	0.04	
Catalyst circulation, tons per hour	270	
Space velocity, V/V/hr.	1.7	
Catalyst: Oil ratio V/V	3.8	

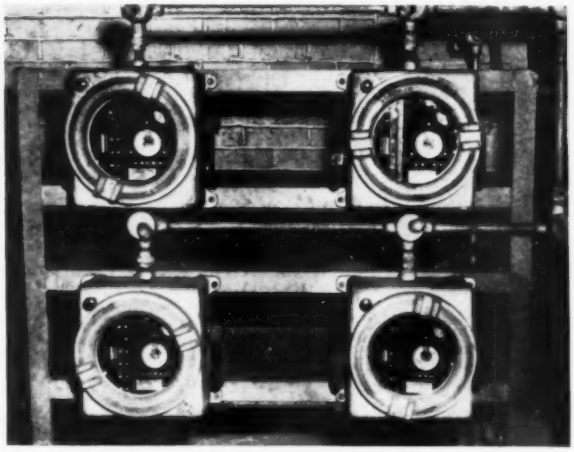
Product yields—	1,000 lb. hr.	B.P.S.D.	Weight per cent	Volume per cent
Reactor charge	184.6	14,400	100.0	100.0
Debutanized gasoline (356 90 per cent)	59.5	5,460	32.3	37.9
Naphtha	8.7	700	4.7	4.9
No. 2 fuel oil	71.8	5,570	38.8	38.6
Heavy cycle stock	19.3	1,410	10.5	9.8
Isobutane	6.9	840	3.7	5.8
Butylenes	3.9	440	2.1	3.1
Normal butane	1.8	210	0.9	1.4
Propane	2.2		1.2	
Propylene	2.7		1.5	
Ethane and lighter	1.9		1.1	
Coke	5.9		3.2	
Totals	184.6	14,630	100.0	101.5

Physical tests—	Fresh reactor charge (TSO)	Debutanized gasoline	Naphtha	No. 2 fuel oil	Heavy cycle stock
Gravity, °A.P.I.	30.3	59.3	35.7	28.4	18.3
A.S.T.M. distillation:					
I.b.p.	340	92	370	424	458
10 per cent	442	122	399	472	592
50 per cent	566	237	414	518	682
90 per cent	726	356	427	596	
E.p.	760+	396	447	640	
Per cent at 700° F.					63
Color	3.5	30	27	1.0	6
Flash				202	310
Aniline point				120	140
Res. octane (3 cc. TEL)		95.0			

Goggles, face shields, respirators, gloves, aprons, foot guards, and other protection devices are used effectively in Sohio's accident-prevention program. Constant vigilance is taught and every man urged to

"Make Safety a Habit"

To dramatize the importance of wearing safety hats around petroleum refineries, Standard Oil Co. of Ohio recently made one of its foremen, Chester Parks, the subject of a large poster displayed on bulletin boards. Parks was standing near a thermal debutanizer tower in No. 1 Cleveland refinery when a 9-oz. piece of casting fell 56 ft. The small piece of casting struck the center of his aluminum alloy safety hat making a ¾-in. dent. All Parks suffered was a slight head cut.



Right: These four combustible gas alarms continuously sample the atmospheres between pairs of compressors in the gas compressor room. Alarms are calibrated so as to activate both visual and audible warning signals when gases are present at points between 20 and 40 per cent of lower explosive limits. The combustible gas alarms continuously "sniff" the atmosphere to detect propane and butane gases around the compressors.

A STEPPED-UP safety program reaching into all branches of the manufacturing end of its business has enabled Standard Oil Co. (Ohio) to reduce appreciably the accident-frequency rate for its refineries. Operating under the slogan "Make Safety a Habit," the program has lowered accidents from 12.87 per million manhours in 1946 to 4.60 in 1950, a reduction of over 65 per cent. Safety education for supervisory, as well as production and maintenance personnel, and extensive use of safety equipment and instruments in its five refineries have helped Sohio establish and maintain accident-frequency rates well below the national average of the oil-refining industry.

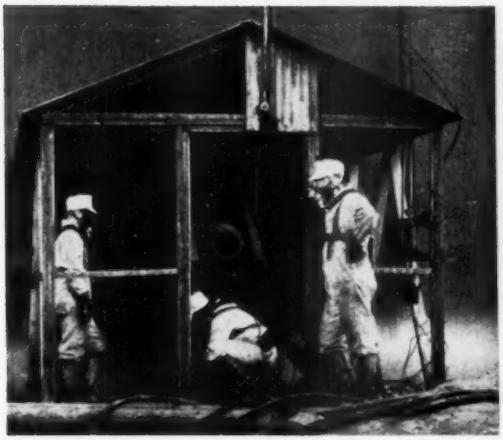
"It is our endeavor to make every employe's job safer by teaching safe-work methods and by eliminating physical hazards," Otto C. Haier, safety director of Sohio's manufacturing department said in a recent interview at Sohio's Cleveland office. "That was the goal set by E. B. McConnell, vice president in charge of the manufacturing department, when he took office several years ago. To this end our men are being thoroughly schooled in safe practices, in the use of various types of personal protective equipment required for the hazards of their work, and in correcting and reporting unsafe conditions."

Safety engineers at each of the refineries devote a considerable portion of their time to helping supervisors in their efforts to promote safety consciousness and to discover and eliminate unsafe conditions. Mechanical-department supervisors conduct safety meetings with their men once each week. The material used in the discussions in many cases has been supplied by the safety engineer. Process-department employes are reached through such means as bulletin-board releases, personal contacts by supervisors, payroll enclosures, and safetygrams. Explanations of manufacturing-department safety rules as contained in the recently issued safety-rule booklet, National Safety Council Safety-graphs, descriptions of disabling accidents from the plant or other plants, and many more discussion aids are used throughout the plants.

Safety meetings.—Safety meetings are also held for supervisors, or the subject is discussed in regular operating meetings. New programs, new techniques, and new procedures are devised or discussed in such meetings. Every effort is made to obtain full cooperation of all workers through the establishment of active union-management safety committees and by including workers on accident-investigating committees.

In addition to all the promotional and educational efforts mentioned above, it has long been recognized that personal protective clothing and equipment is a necessary part of a complete accident-prevention program. Although efforts are constantly being made to prevent accidents at their source, personal protective clothing and equipment is still required to prevent injuries on many jobs. Accordingly, each of the company's five refineries, located in Cleveland, Toledo, and Lima, Ohio, and Covington, Ky., is supplied with a full complement of gas masks, hose masks, respirators, goggles, safety hats, combustible and toxic-gas detectors, and many other necessary items of personal protection.

All refinery employes working where falling objects are a continu-



This cleaning crew is ready to enter a storage tank which had contained leaded gasoline. The men are equipped with blower-type hosemasks, rubber gloves and boots, and light-colored coveralls. A blower located well away from the tank manhole so that toxic vapors cannot be picked up, supplies air to the men through hose lines. The use of double inhalation tubes insures no interference with a free flow of air should one tube become constructed in a tight place.

Combustible concentrations of vapors cannot hide from this "mechanical nose." Atmosphere conditions in and around tanks, primary towers, piping and manholes, are checked frequently with a small, portable MSA Explosimeter to make sure that vapor concentrations are below, and not within, explosive limits. Powered by flashlight batteries, the Explosimeter gives an accurate reading on the percentage of the lower explosive limit of combustibles present in the atmosphere.

ing hazard, are required to wear safety hats.

Pays dividends.—Wearing these safety hats has paid dividends upon several occasions when men were saved from serious injury or possibly death. Such incidents and others involving the proper use of protective equipment are given full publicity treatment in the manufacturing department's own poster program and in company publications. These serve as constant reminders to other employes that it is essential that they use the protective devices available.

In a recent case, a jagged piece of steel, weighing about 9 oz. was knocked off a tray casting as it was being hoisted to the top of a tower. The broken piece of casting angled away from the tower and struck a supervisor on top of his hat although he was standing about 8 ft. away from the tower—a distance normally considered safe. Despite the fact that the object fell 56 ft. and made a $\frac{3}{4}$-in. dent in the hat, the supervisor suffered only a slight scalp cut. This incident was made the subject of a poster which was used throughout the entire company.

Sohio has gone a long way in overcoming one of the most hazardous of refinery conditions—that of combustible-gas concentrations in confined spaces—by the installation of automatic combustible-gas alarm system. This system, a development of Mine Safety Appliances Co., was adopted following a costly explosion in the Cleveland refinery's gas-compressor house 5 years ago. Since the detecting and alarm system was installed, it has operated several times to warn of gas concentrations approaching explosive limits, and refinery personnel has taken immediate remedial action to prevent a blast.

Alarms.—Four explosionproof combustible-gas alarms in the gas-compressor house now continuously sample the atmosphere at four points between pairs of compressors. Air samples, drawn into the instruments at a velocity of about 10 ft. per second from intakes slightly below floor level, are passed over a sensitized platinum filament. Resistance of the platinum wire is increased in proportion with the temperature rise resulting from this combustion and the electrical circuit between the two filaments is unbalanced in direct ratio.

An indicating meter on the face of the instrument shows the concentration of combustible gases at all times. When the concentration reaches a predetermined limit—40 per cent of the lower explosive limit—warning signals are activated as the meter needle is drawn by magnetic attraction to a contact point closing the warning circuit. Red lights flash on the instrument, and horns sound in the compressor house.

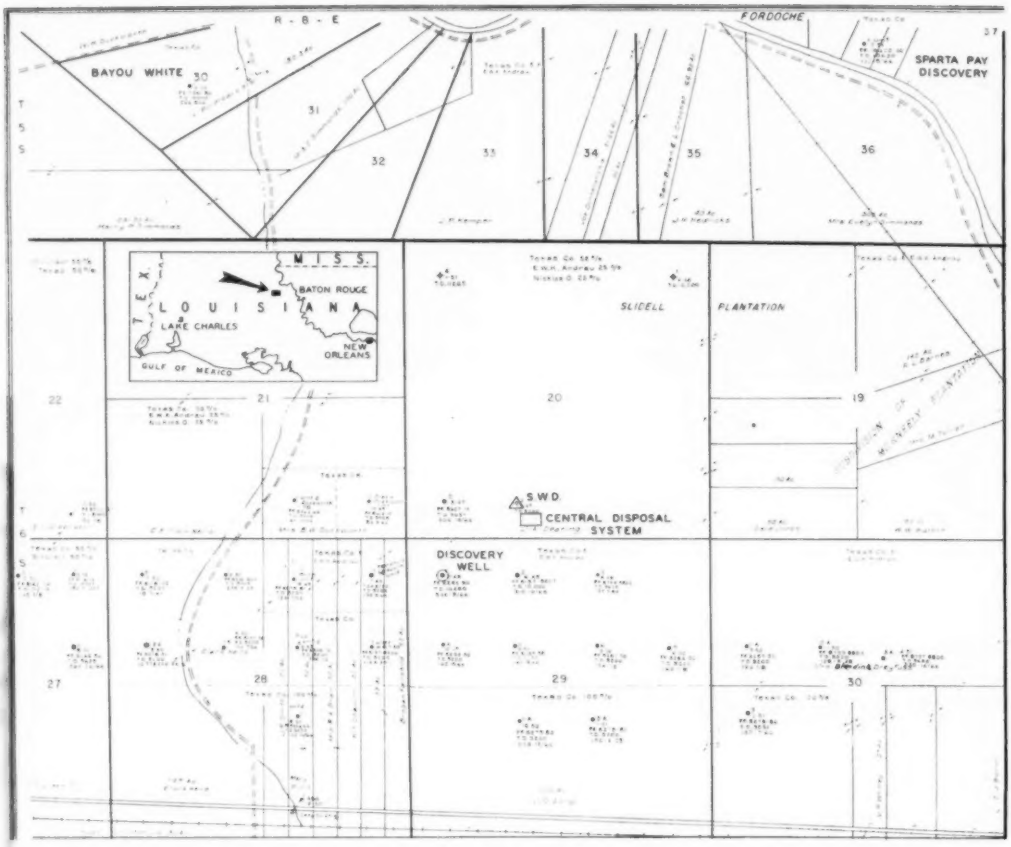
A similar protection system is installed in the refinery's butane pumphouse. The instrument itself is mounted outside the building and air samples are piped to it. Visible and audible warning signals are mounted with the instrument and there is a signal extension to a light on the control panel in a nearby control room.

Besides these fixed instruments, the refineries use "Explosimeters," portable gas-detection apparatus, to check atmospheric conditions in the vicinity of spots. With this instrument it is possible to use a sampling line up to 50 ft. in length to check recessed areas impossible to reach otherwise. Calibrated to give direct readings for many types of combustible gases and vapors, the instruments have proved to be advantageous for checking tanks, vessels, towers, manholes, and other areas before welding or "hot work" is started.

Tank cleaning.—The American Petroleum Institute's recommended methods of cleaning petroleum-storage tanks are adhered to strictly. These methods involve removing as much of the product from the tank as possible, blanking off of all lines entering the tank, opening of manholes, forced ventilation of the tank using air movers until the tank tests vapor free. Tests also are made thereafter during the cleaning work. As a general rule no worker is permitted to enter tanks until the latter have been tested and found gas-free. If it is necessary to enter the tank before it is declared gas-free, hose masks must be worn.

Cleaning teams working in tanks which have contained leaded gasoline are furnished with, and required to wear, hose masks which supply them with fresh air under positive pressure from an uncontaminated source, even though the tank is free of gasoline hazards. These masks fully protect the men against all gases, vapors, dusts, mists, and oxygen deficiencies while they are performing their work. At the same time maintenance costs are kept down because the equipment can be used over extended periods without replacement of chemicals or compressed oxygen.

Goggles, face shields, respirators, gloves, aprons, foot guards, and many other types of protection devices are effectively used in Sohio's accident-prevention program. Constant vigilance, and being equipped to handle any eventuality, are two of the important factors in Sohio's over-all refinery safety program.



FIELD PLAT.—Fordoche oil field, Pointe Coupee Parish, Louisiana. Present development in the downblock by The Texas Co., operator. Sinclair Oil & Gas Co., Nicklos Oil Co., and E. W. K. Andrau is shown here. North of the township line which roughly parallels a major fault are found Bayou White field and the new Sparta sand discovery of The Texas Co. (Map courtesy Zingery Map Co., Houston.)

PROGRESS REPORT:

Fordoche Field, Lottie, La.

Tough drainage and road-building problems, thin-pay completions in unconsolidated sands, automatic salt-water-disposal system feature Fordoche field development in South Louisiana

by Joseph A. Kornfeld
Mid-Continent District Editor

FORDOCHE field, located 2 miles west of Lottie, La., in the swamps of the Atchafalaya River, has presented major problems in drainage and road building. Today, 30 months after its discovery, there are 21 oil wells on production with an allowable of 2,925 bbl. per day, productive from three oil reservoirs at a series of depths between 8,120 and 9,800 ft. The Texas Co., Sinclair Oil & Gas Co., and Nicklos Oil Co. are major operators in this area.

Problems in clearing location in this morass include: removal of trees, brush, and undergrowth; draining canals; cutting roadway on fill for drill site; building road base, and construction of turnaround. In preparing location for The Texas Co. 1-A Long, three crawler-type tractors and two draglines were used; however, only 5 days were required to clear this location. Clearing costs in this swampy terrain range from $175 to $200 per acre.

Road Types

A system of roads extending for a total distance of 6 miles is used to service Fordoche field. Roads are 26

FORDOCHE OIL FIELD—POINTE COUPEE PARISH, LOUISIANA

METHOD OF EXPLORATION: Reflection seismograph.
DATE OF DOME DISCOVERY: December 1948.
DATE OF FIRST OIL PRODUCTION: December 25, 1948.
DISCOVERY OIL WELL: The Texas Co. 1 J. O. Long, approximate C NW NW¼ 29-6s-8e, total depth 10,280 ft., initial production 332 bbl. of oil through 9/64-in. choke through casing perforations 8,282-90 ft.
WELLS:
Flowing oil wells (June 1, 1951) 21
Gas-distillate wells (June 1, 1951) 2

Deepest well drilled: The Texas Co. 4 J. A. Dearing, C NW NW¼ 20-6s-8e, total depth 11,265 ft., dry and abandoned, January 1951.
WELL SPACING:
Oil wells (state conservation orders Nos. 189, 189-A, 189-B), ac./well 40
Gas-distillate wells (state conservation orders Nos. 189-C, 189-D, 189-E), ac./well 320
PRODUCTION:
Special allowable, April 1, 1951, bbl./day 2,925
Cumulative oil production (January 1, 1950), bbl. 172,945
PIPE-LINE OUTLET: Interstate Pipe Line Co. 4-in. crude-oil pipe line to Baton Rouge, La.
GAS OUTLET: Interstate Gas Pipe Line Co. natural-gas line to Baton Rouge, La.
OPERATORS: The Texas Co., Sinclair Oil & Gas Co., E. W. K. Andrau.

TABLE 1—DEFINITION OF HYDROCARBON RESERVOIRS, FORDOCHE FIELD, POINTE COUPEE PARISH, LOUISIANA

A. Crude-Oil Reservoirs

Reservoir and description—	Depth	Described in state order* No.	Date
DEARING—2 J. A. Dearing, C SW SW 20-6s-8e	8,594-8,614	189	5-22-50
CLARK—1 C. E. Clark heirs and Mrs. B. W. Duckworth Unit 1, C SW SE 21-6s-8e	8,120-8,206	189-A	5-22-50
LONG—5 J. O. Long, C SE SW 29-6s-8e	8,222-8,293	189-B	7-11-50

B. Gas-Distillate Reservoirs

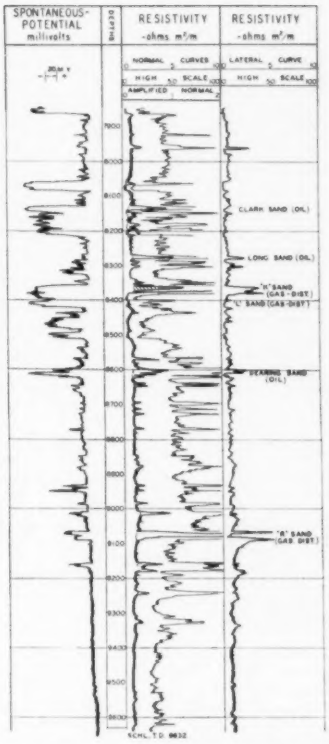
"K"—1 J. O. Long, C NW NW 29-6s-8e	8,323-8,377	189-C	7-11-50
"L"—1 J. O. Long, C NW NW 29-6s-8e	8,389-8,491	189-D	7-11-50
"R"—2-A J. W. Green, Sr., C SW NW 28-6s-8e	9,077-9,096	189-E	10-10-50

*Data from official state orders, Department of Conservation, Baton Rouge, La.

TABLE 2—COMPARISON OF CASING PROGRAMS, FORDOCHE, FORDOCHE-SPARTA, LOTTIE, AND BAYOU WHITE FIELDS, POINTE COUPEE PARISH, LOUISIANA

	Downblock area		Upblock area	
	Fordoche-Frio	Lottie field	Bayou White field	Fordoche-Sparta
Conductor pipe	16-in. at 60 ft.	20-in. at 30 ft. 16-in. at 70 ft.	16-in at 50 ft.	16-in. at 65 ft.
Surface pipe	10¾-in. at 2,819 ft.	10¾-in. at 2,825 ft.	10¾-in at 2,810 ft.	10¾-in. at 2,825 ft.
Long string	7-in. at 9,200 ft.	7-in. at 10,042 ft. STH; 5-in. at 10,300 ft.	7-in. at 8,036 ft.	5-in. at 10,500 ft.
Tubing	2½-in. at 9,068 ft.	2-in. at 10,214 ft.	2½-in. at 8,342 ft. on packer	2½-in. at 8,342 ft. on packer

PORTABLE MUD PITS.—The swampy topography, even when properly drained, makes the use of portable steel mud pits a necessity at Fordoche.



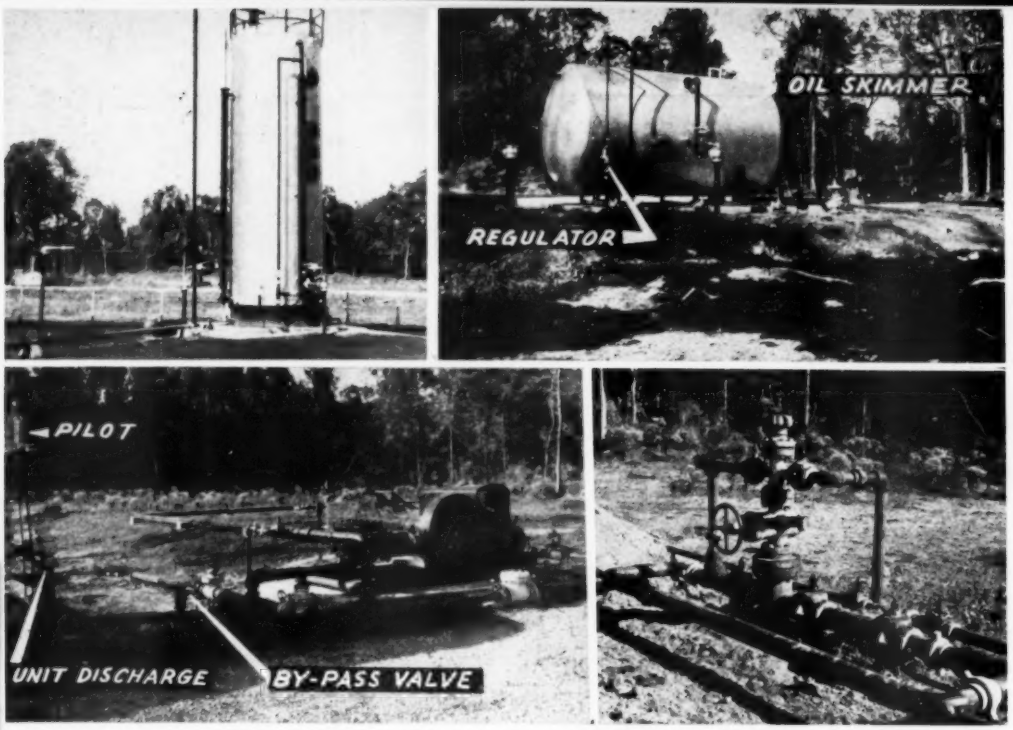
Type electric log for the downblock sector of Fordoche field, showing formations extending from 7,650 ft. to below 9,600 ft., in the Frio series. The well is The Texas Co. 2 J. W. Green, Sr., approximate C SE NE¼ 27-6s-8e, total depth, 9,629 ft. completed on August 12, 1950. It is discovery well of "R" sand, a gas-distillate reservoir, completed through casing perforations from 9,066-84 ft. Mud resistivity is 2.3 ohms m²/m. at 114° F. and electrode spacings are AM = 16-in., AM′ = 64-in., and AO = 18-ft. 8-in.
(This cut was incorrectly run last week on page 203, June 21 edition.)

ft. in width with 6-ft. shoulders; height is 8½ ft. from base to top of fill. Dirt-moving costs range from 25 to 30 cents per cubic yard; in some cases, this item has cost as high as 50 cents per cubic yard.

Road cover ranges from 1 ft. 4 in. to 3 ft. 8 in. above road base. This comprises 1 ft. of river sand with a cover of gravel.

As much as 90,000 board feet of lumber is required for 1,320-ft. road mat and for 70 by 70-ft. turnaround for each location. Wells are set 117 ft. back from road center. Lumber used is 3 in. thick by 8 ft. long. Costs of laying and nailing in are $12 per 1,000 board feet. It required 60 board feet per linear foot of road. New lumber costs are $40 per 1,000 linear feet.

Recently, The Texas Co. has converted board-road laterals to perma-



DISPOSAL SYSTEM.—At Fordoche, all produced salt water is returned to centrally located automatic disposal system. (Upper left) Water leaves heater-treater at 13-psi. pressure such as shown in this installation on J. O. Long tank battery; (upper right) field gathering system takes water to horizontal 5,000-bbl.-capacity water conditioner on Dearing lease; regulator at left keeps gas blanket of 4 psi. on water; oil skimmer and emergency overflow shown in front center of tank; (lower left) arrangement of fluid pump, diaphragm operated bypass motor valve and manifold at automatic salt-water-disposal system; hookup is designed to permit water leaving conditioner at left to flow directly to disposal well or to enter pump section; (lower right) view of well head and hookup at 3 S. W. D. on C. W. Dearing lease; hookup of this tubed well permits backflow with high-pressure gas to clean well in case of sand invasion.

nent road by taking up the 3 by 8-ft. board and relaying again as matting. This is covered by 1 ft. of gravel on top of matting to eliminate maintenance costs. Cost of conversion is estimated at $16,000 for each road for a single location.

Downblock

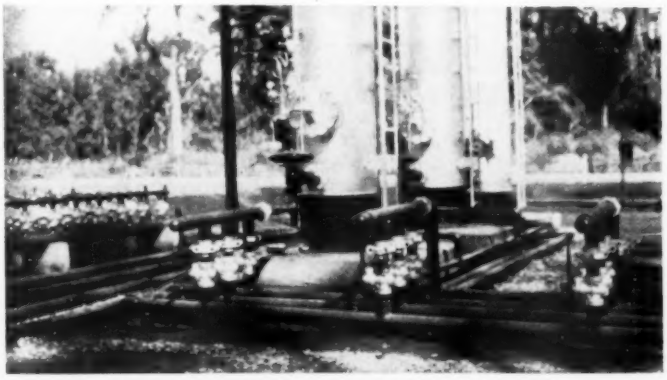
Fordoche lies on an elongated anticline occurring in downblock of an east-west fault, downfaulted to the coast. This is sometimes called "Tepetate-type" structure because of its occurrence at Tepetate, Acadia Parish, Louisiana.

Oil-well development in Fordoche field proper in the downblock has been confined to three reservoirs named locally as follows: Clark sand at 8,160 ft., Dearing sand at about 8,600 ft., and Long sand at about 8,250 ft. These reservoirs are described in Table 1.

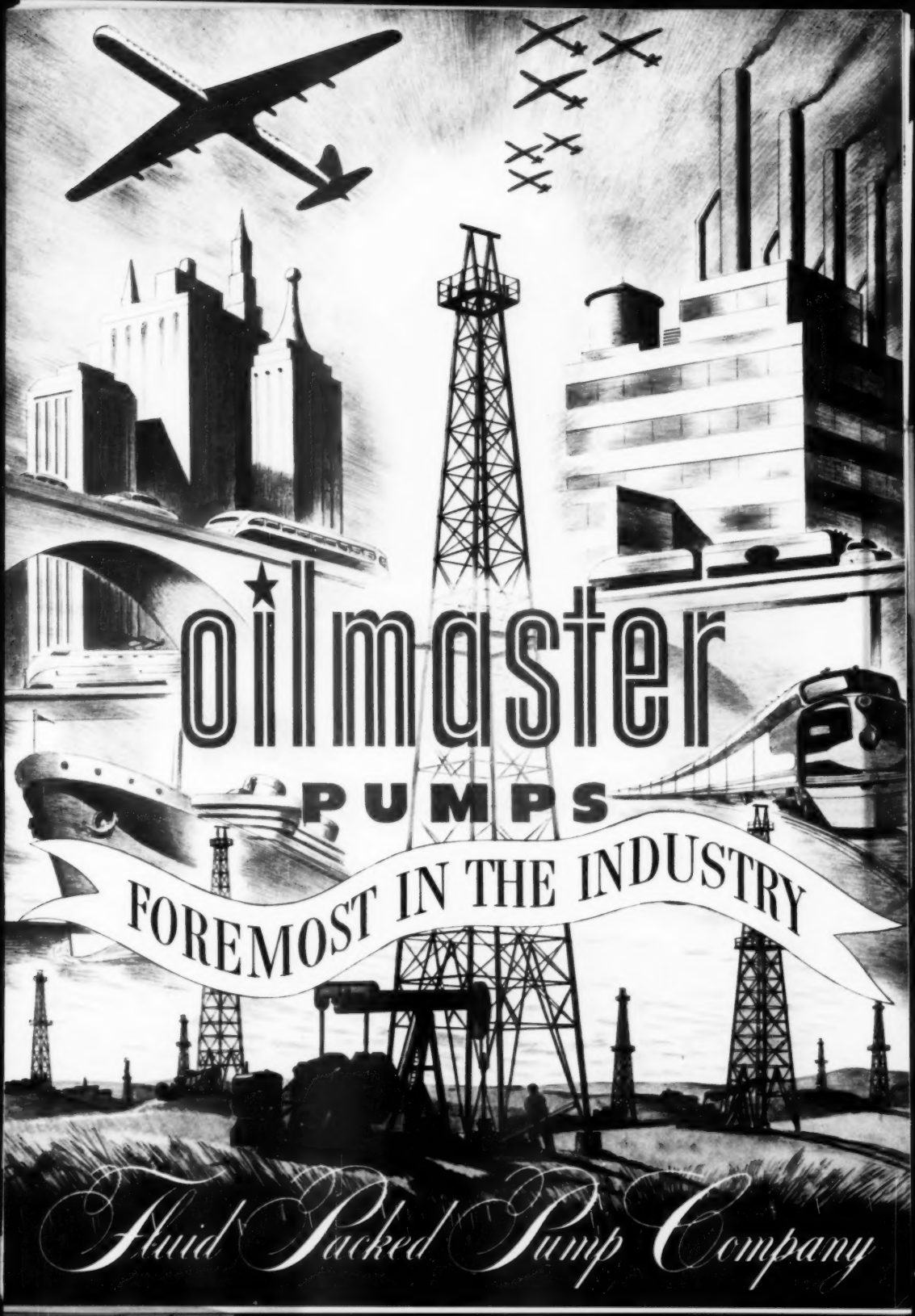
The Department of Conservation has recognized three gas-distillate reservoirs in the downblock area at Fordoche as follows: "K" sand found at 8,323-77 ft.; "L" sand logged at about 8,389-8,491 ft.; and "R" sand at 9,077-96 ft. The first two are behind-the-pipe reserves, while the "R" is exposed in two wells on the west side of the field.

The "R" sand of Marginulina series is that found in The Texas Co. 2 J. W. Green, Sr., C SE NE 27-6s-8e, from 9,077-96 ft. It was completed on August 12, 1950, for an initial potential of 302 bbl. of 58°-gravity distillate on a 24/64-in. choke with a flowing tubing pressure of 2,900 psi.; flow was accompanied by 7,897 M.c.f. per day of gas. Average porosity of this reservoir is 35.9 per cent and average permeability is 649 md.

East offset to this now sand discovery was same interests' 2 J. W.



MANIFOLD HOOKUP.—This arrangement permits switching from the low-pressure separators, operating at 20-psi. back pressure, to either heater-treater or directly to lease tanks. In addition any of the seven wells served by this battery may be tested individually. View at Texas Co. E. L. Long "A" tank battery.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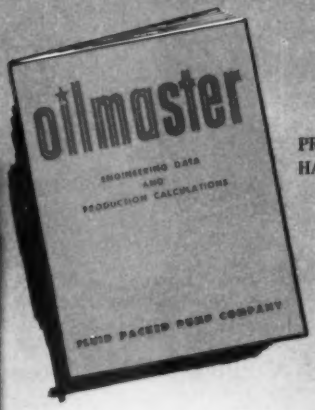
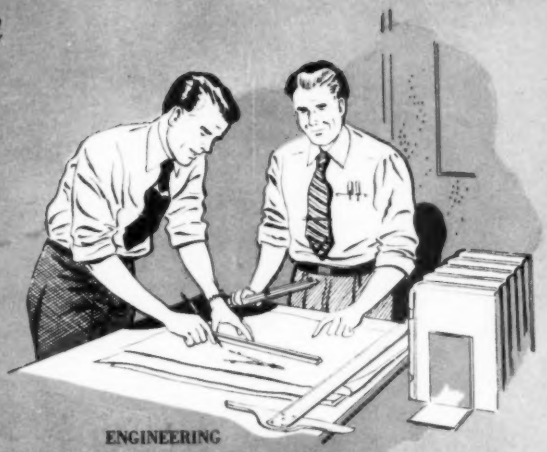


PRODUCTION HANDBOOK



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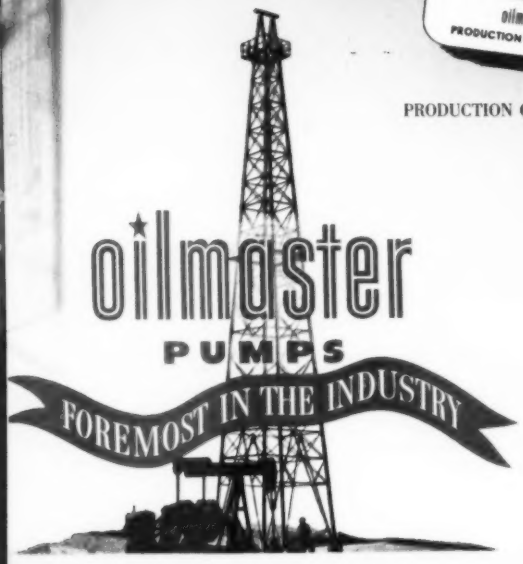

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Green, Sr., located in C SW NW 28-6s-8e, completed on August 19, 1950, for an initial potential of 10,773 M.c.f. of gas per day on a 24/64-in. choke under flowing tubing pressure of 3,150 psi. Casing perforations were made from 9,078-9,906 ft.

Upblock Area

Deepest reservoir discovered to date is the Sparta sand discovered on February 23, 1951, by The Texas Co. 1 State-Reno et al Unit 1, located 3,532 ft. north and 2,505 ft. west from the SE 37-5s-8e. Initial potential was 132 bbl. of 48.8 -gravity oil per day through 8/64-in. choke plus 294 M.c.f. per day through 64 shots through casing perforations from 10,420-36 ft. Casing program employed in drilling this well was identical to Fordoche field wells 1½ miles southward except that the oil string was 5-in. instead of 7-in.

Bayou White field.—Discovery well of this oil field is The Texas Co. 1 Lillie Boudreaux et al, located 1½ miles northwest of Fordoche field and 2 miles west of the town of Lottie. It was completed on March 9, 1950, for an initial potential of 206 bbl. of 38.8 -gravity oil per day through an 8/64-in. choke through casing perforations from 7,981-86 ft. Gas-oil ratio was 335 cu. ft. per bbl. Flowing tubing pressure was 1,125 psi. Total depth was 10,002 ft. with 7-in. casing set at 8,036 ft. for completion.

Steam Rigs

Nicklos Drilling Co. of Houston has drilled 31 wells at Fordoche, Bayou White, Lottie and Sherburne for The Texas Co. and Sinclair Oil & Gas Co.

Standard 136-ft. derricks are used with 26 by 26-ft. base. Two 14-ft. substructures are employed for supporting derrick and draw-works engines. Derrick is built with a floating gin pole in about 2 days.

When rigging up, 8 lines are used; when setting long string, 10 lines are strung. Three drill collars are used for shallow digging; as production depths are approached, additional collars are added until a maximum of six are on the string. A surveying instrument is run every 500 ft. by contractor. Driller holds pipe weight to about four to five points.

Hole size and casing.—The conductor is 16-in. set at 60 to 65 ft. A 12¼-in. hole is cut to 2,800 ft. where 10¾-in. surface pipe is set; 500 sacks of cement are put behind the pipe. At this point, hole is reduced to 9⅞ in. From 12 to 15 bits are required to drill an average 9,200-ft. well.

For completions in the Dearing, Clark, and Long oil sands of the Frio (Oligocene) series, 7-in. oil string is set usually at 9,200 ft. However, for development of the new Sparta (Eocene) reservoir, discovered on February 23, 1951, 1½ miles northeast of the field, the long string is 5-in. set at 10,500 ft. About 850 sacks of cement are placed behind the long string for completion; scratchers and centralizers are used consistently.

Draw works.—Nicklos uses Wheland Unitary draw works B-3700-B designed for six hoisting speeds, three rotary speeds, and two cathead speeds, with only one engine-driven sprocket. Diameters are: drum shaft at drum, 10 in.; drum shaft through sprockets, 9 in.; line shaft, between bearings, 8 in.; and jack shaft, between bearings, 8 in. Line shaft is idle when using intermediate jack shaft speed. The unit is equipped with a 40-in. hydraulic-type brake.

Power is supplied by 12 by 12-in. twin-cylinder steam engines serviced by four 125-hp. boilers. Boiler-feed pumps are 10 by 4½ by 10 in.

Mud pumps.—Nicklos used at 1-A J. O. Long: One Ideal 15¾ by 8½ by 20½-in., and two Lucey 15 by 7¾ by 18-in.

Portable steel mud pits.—Swampy topography, even when properly drained, makes use of portable steel mud pits a necessity at Fordoche. Three steel sections used measure 8 by 30 by 6 ft.

Earthen mud pits.—Usual practice at Fordoche calls for digging three mud pits, 30 by 8 by 6 ft. A single reserve pit measures 200 by 100 by 5 ft.

Water supply.—Water for drilling is obtained from shallow sand found at about 180 ft. Water-well drilling rig is used.

Tank batteries.—Standardized tank batteries at Fordoche are exemplified by The Texas Co. E. L. Long battery servicing seven wells. Installation includes: three 1,000-bbl. storage tanks; two high-pressure (200-psi.) separators; one low-pressure (20-psi.) separator; one heater-treater.

Storage tanks are set on 14-in. concrete bases. A pipe-reinforced wire fence, measuring 98 by 197 ft., surrounds all-enclosing broad firewalls.

Completion Methods

After well is drilled to contract depth, conventional electric logs are run of entire bore hole. MicroLogging survey is conducted on pay section detail to evaluate thin sand stringers characteristic of Frio series at Fordoche field. After long string is run and cemented, radioactivity logs are run. Bridge plug is then set about 10 ft. below base of lowest zone to be tested.

Prior practices.—Early in development of Fordoche field, perforator would be run, detonated, and pulled, followed with testing tool. If pay proved to carry water or showed low productivity, testing tool would be removed. Crews would then run squeeze tool, squeeze off perforations, and come out with tool. Perforator would then be rerun into hole opposite next higher zone indicated by log data, detonated, pulled, and testing tool run to evaluate pay zone. Production packer would be set on tubing and tubing swung.

Later practices.—During 1950, practices were modified at Fordoche by employment of following procedures:

1. Run, detonate, and pull gun perforator.

2. Run production packer on wireline and set about 8 ft. above top of perforated zone.

3. Perform formation testing through production packer.

a. **Dry method:** Run tubing in hole **dry** mounting cast-iron disk on end to prevent fluid entry into tubing; after tubing is lowered to position in packer, drop rod through tubing head to break disk, allowing fluid to enter hole.

b. **Mud displacement method:** Run tubing into hole and displace heavy mud in tubing with water or lighter drilling mud; then set tubing down to sealin packer permitting bottom-hole pressure to overcome hydrostatic head of light fluid.

4. Run sand consolidation material in two stages of 200 gal. each through tubing, let set, and flush out with diesel oil allowing well to come in under its own pressure, clean, and turn into tanks.

5. If zone makes water or shows low productivity, squeeze immediately through packer and remove tubing; this allows back-pressure flapper valve in bottom of packer to close automatically, holding pressure on cement and allowing packer to be used as bridge plug.

6. Rerun perforator and shoot next higher pay zone, set another production packer 8 to 10 ft. above top of perforations and repeat procedure, as in (3) and (4).

Production packer is of cast-iron construction and remains as part of permanent bottom-hole equipment. Packer is built with lead sheaths immediately above and below rubber packing element; it is built to withstand differential pressures in excess of 7,500 psi. and bore-hole temperatures in excess of 300 F.

In setting packer, electric circuit is closed in logging truck to ignite powder charge in special setting tool for the packer; gas pressure created in chamber forces oil-insulated piston downward to impart mechanical action to packer sleeve, which completely sets packer and subsequently parts release stud to free setting tools.

To prevent loose Frio sand from sanding up well bore, operators have employed sand consolidation material. The Texas Co. has experienced only one workover since this material was employed.

Drilling Performance

Time required to cut the first 7,000 ft. of hole has been reduced from 17 days as at 1 J. A. Dearing during April and May of 1948 to 6½ days for 2 J. W. Green, Sr., during June and July 1950.

Only 12½ days were required to cut 9,000 ft. for the 2 J. W. Green, Sr., well; electric log was run on the fourteenth day at 9,200 ft.

On the Sparta sand discovery oil well, The Texas Co. 1 State-Reno et al Unit 1, the first 10,000 ft. was cut in 25 days; this included coring time at 8,000, 9,000, and 9,600 ft.

Salt-Water-Disposal System

A system of 8⅝-in. main line and 6-in. lateral line has been developed

to handle gathering of salt water produced with oil at Fordoche. Trencher machine is set to make a cut 24 in. deep and 15 in. in width.

Central conditioner.—Water is gathered by combined gravity flow and pressure from 10 tank batteries. Under a closed system, water leaves treater at a discharge pressure of 13 psi. and passes through gathering system to centrally located 5,000-bbl. capacity water conditioner. Regulator on unit is set to operate at 4 psi. to maintain gas blanket on water surface.

Oil skimmer and its control mechanism serves purpose of discharging oil as it accumulates. It also provides an emergency overflow to reserve pit in case of pump or engine failure and when disposal well sands up. Pressure differential between 13 psi. at treater discharge and 4 psi. setting at water conditioner assists movement of water.

At discharge outlet of conditioner, water is picked up by a 5 by 6-in. piston-type pump driven by internal-combustion six-cylinder engine. Diaphragm-operated bypass meter valve is operated by pilot when water in conditioning tank drops to a low level so that pump will not take suction on gas.

Disposal well.—A 9,200-ft. dry hole located in north-central part of Fordoche field has been converted to this service by The Texas Co. Its 3 C. W. Dearing in 20-6s-8e was worked over and pipe set to inject water into a 4,000-ft. Miocene sand. Well is tubed to permit back flow with high-pressure gas to clean well in case of sand invasion.

An earthen reserve pit, 250 by 250 ft., is used for emergencies and as standby.

Gas Utilization

Operators have three separate contracts for the gathering and sale of gas in the Pointe Coupee Parish area from Fordoche, Bayou White, Lottie, and Sherburne. Market is Interstate Gas Pipe Line Co., a local and intrastate line which extends eastward to Baton Rouge.

Currently, operators sell gas from six gas wells in the area at the rate of 1,500 M.c.f. per day. Gas from the Sherburne area is delivered at a pressure of 550 psi. to Interstate. From 1 V. J. Kursweg et al, 25-6s-7e, gas is taken off of a 10 by 12-in. 1,000-psi. w.p. two-stage horizontal separator.

Oil-well gas.—A total of 3,500 M.c.f. of gas per day is being sold from the area by The Texas Co. and Sinclair Oil & Gas Co. Of this total, 3,000 M.c.f. is from Fordoche and 500 M.c.f. from Lottie field.

Spacing Rules

Oil reservoirs.—Spacing provisions of state conservation orders Nos. 189, 189-A, and 189-B prescribe drilling units of approximately 40 acres each, with well locations within 200 ft. of the center of the unit.

Gas-distillate reservoirs.—Spacing provisions of state orders Nos. 189-C, 189-D, and 189-E specify drilling units of approximately 320 acres each. Each unit shall consist of either the east one-half or west one-half of a regular governmental section, the orders prescribe.

Allowables

Fordoche operates under a special allowable of 2,925 bbl. per day for April 1, 1951. Crude-oil outlet is by Interstate Oil Pipe Line Co.'s 4-in. line to Baton Rouge; this line parallels the highway.

Acknowledgments

Acknowledgment is made to The Texas Co. for arrangement of field trip in connection with this article. Particularly, thanks are expressed to J. H. Rambin, Jr., division manager; S. T. McCardell, division petroleum engineer, South Louisiana division, New Orleans; J. A. Rhodes, district superintendent; W. E. Bonner, drilling and production foreman; M. Squires, petroleum engineer; G. E. Mott, civil engineer; and H. C. Pill, construction foreman, all of New Iberia.

Thanks are given to D. E. McMahon, president, Nicklos Drilling Co., Houston, for details on drilling and rig data.

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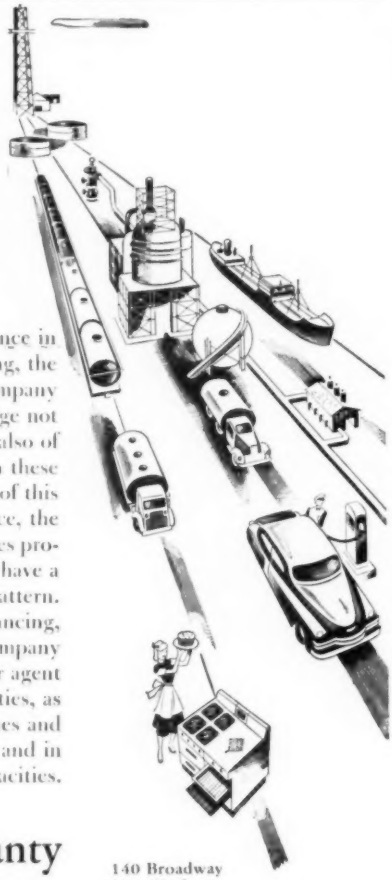

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Workmen reporting for duty on the morning shift at Shell's Wood River, Ill., refinery.

Plan Your Personnel Requirements

Here's a practical method of protecting yourself against future draft calls and loss of employes to other industries

by Robert F. Welch

PETROLEUM refiners who have their eyes on the future are mapping out a course of action to minimize the labor headaches almost certain to grow out of the present international confusion. Our Government is definitely committed to a mobilization program which will multiply the difficulties of obtaining trained personnel—regardless of whether total war comes or not.

There's really very little protection offered in the fact that establishments refining petroleum appear on the Commerce Department's tentative list of essential activities. It's evident that deferments are being granted for only short periods, frequently allowing very little time to obtain a replacement. And even though refineries can hardly depend on the average man looking for a job to perform highly skilled tasks, it is still significant that our unemployment pool numbers only about one-third that available in 1940. All employers suffer when manpower reserves approach the vanishing point.

What can plant manager do now to protect themselves against future draft calls and loss of employes to other industries? Simple as it sounds, the most effective protection is a complete analysis of present job requirements. Find out just who your employes are and what they're doing. You'll undoubtedly see where improvements can be made and also strike upon methods of regrouping duties to compensate for loss of trained personnel.

First of all, make it a point to obtain the exact age of everyone on the payroll. There's not much you can do to hold those in the 18 to 25-year-old group. Nor should you count on being able to keep men from 26 to 29. Age classifications now in force will undoubtedly change, so it will pay to keep up with latest developments.

Ascertain Draft Status

Don't assume that older men will step forward to fill vacancies as they occur. Pensioners probably won't be as anxious to get back to work as they were 10 years ago. Expansion of social security benefits will lessen their desire and need for more money.

Instruct all your employes to find out definitely if they're on inactive reserve lists for any of the services. Many assume that they have been dropped when they cease attending drill, yet they're still subject to call with little or no consideration given job status or number of dependents. Some veterans who were naval officers during the last war don't realize that they were never actually discharged—only released to inactive duty. Unless their formal letter of resignation has been accepted, they're still on reserve rolls.

A comprehensive survey of all work performed can be very valuable, even if you're convinced that none of your people will leave for the service. It's a good idea to have each person write out a description of his own duties. Nothing fancy, only a simple resume in his own language of what the job is. There are three big advantages to this step: (1) the analysis will disclose how well the man understands his responsibilities, (2) it will uncover any tasks for which no one has been made responsible, and (3) it provides the necessary information for recruiting new people.

From the reports submitted, you can compile a complete list of all the functions performed by those on the payroll—or revise your present list. Most plant managers will find it very worth while to make up a chart of these functions, listing them across the top of a large sheet of paper. Then write the names of all employes down the left-hand side, drawing lines both vertically and horizontally across the sheet. By placing check marks in the squares where job and employe lines intersect, you can determine at a glance the qualifications of every man, and on which jobs you should protect yourself by teaching another person how to handle them.

At the same time employes are asked to outline their work, have them list any other duties which

(Continued on page 79)

WATER-FLOOD OIL RECOVERY

in Washington County, Oklahoma

4. Wellsville Oil Co. Flood No. 6

by

C. H. Riggs* and William C. Smith*

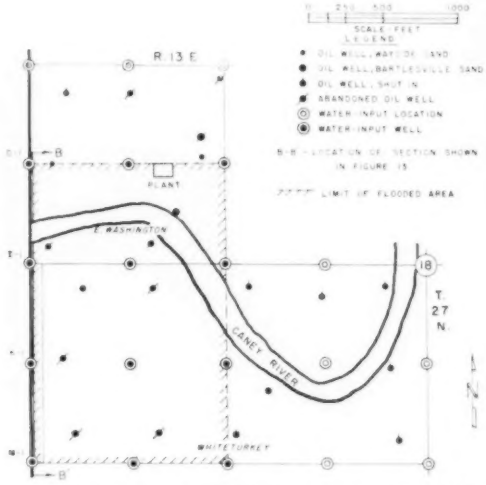


Fig. 1—Wellsville Oil Co. Flood No. 6, Washington County, Oklahoma, March 1, 1951.

THE Wellsville Oil Co. Flood No. 6 is located in 18-27n-13e, about 2 miles north and 2 miles west of Dewey, Okla. In March 1951 the developed area of the flood includes 60 acres of the 40-acre Washington and 80-acre Whiteturkey (now Peters) leases. Fig. 1 is a map showing the location of the flooded area and status of the wells as of March 1951.

In this area oil is produced from the Wayside and Bartlesville sands, but only the latter is being flooded. The top of the Bartlesville sand occurs at a depth of approximately 1,285 ft. The total thickness of the sand is approximately 45 ft., but the upper beds are depleted and the lower beds are water saturated so that the floodable oil-productive section is no greater than 20 ft. Included in this section are several shale partings which, when disregarded, reduce the 20-ft. section to a net average thickness of 15.7 ft. of oil-productive sand.

Fig. 2 is a comparison of core analyses from wells along the west line of the property. These data show that the porosity of the oil-productive section of the sand ranges from 12 to 19 per cent and averages 15.6 per cent. Although the permeability varies greatly between wells and between beds in the same well, there is an upper and a lower zone of greater permeability separated by sandy shale. The average permeability of both zones is 13 md.

The average oil saturation of nine cores taken during the development for flooding was 29 per cent but by comparison of those results with analyses of Electrodrill cores from one well, it is estimated that the oil saturation of the eight cable-tool cores may have been reduced by 2 to 2½ per cent of the pore volume by flushing with the drilling fluid. The total oil content of the cores ranged from 200 to 400 bbl. per acre-foot, but laboratory flood-pot tests indicate that 100 to 250 bbl. of oil per acre-foot is not recoverable by water flooding. It is estimated that 120 bbl. per acre-

*Petroleum engineer, U. S. Bureau of Mines Petroleum Experiment Station, Bartlesville, Okla.

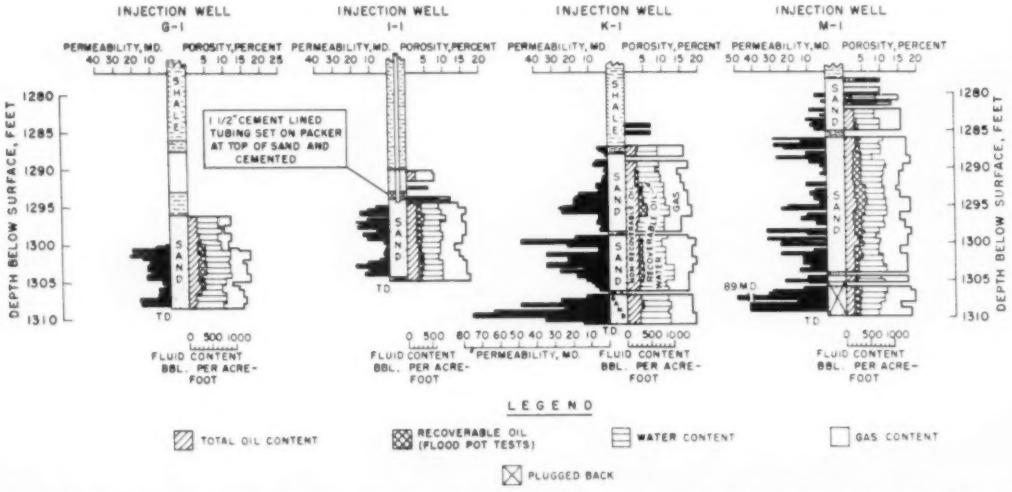


Fig. 2—North south section of Bartlesville sand along the west line of Wellsville Oil Co. Flood No. 6, Washington County, Oklahoma.

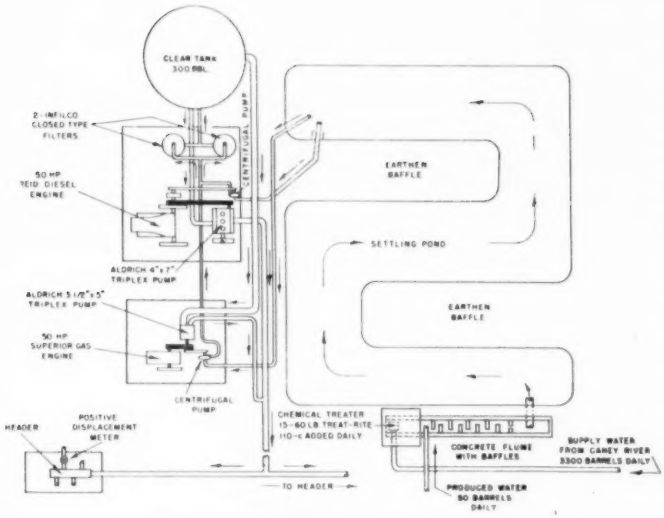


Fig. 3—Wellsville Oil Co. Flood No. 6 water plant, open system.

foot may ultimately be recovered from the 60-acre tract. Core analyses indicate that the water saturation of the oil-productive sand averages about 39 per cent.

Past production history.—The Washington and Whiteturkey (Peters) leases, parts of which are included in Wellsville Oil Co. Flood No. 6, were first developed in 1905. Of the 49 old wells drilled on these 120 acres, 20 produced oil from the Wayside sand, penetrated at a depth of about 565 ft. As oil from both the Wayside and Bartlesville sand was produced into the same stock tanks it is not possible to determine the amount of oil recovered from the Bartlesville sand alone. It is presumed that production from the wells was unrestricted as was the practice when these leases were developed, and that the reservoir energy was dissipated rapidly. Vacuum and air injection were applied during later years but without much success.

Water-Flood Development

A permit to flood 120 acres including the Washington and Whiteturkey (Peters) leases was granted to Wellsville Oil Co. by the Oklahoma Corporation Commission in 1949. Cooperative Refinery Association drilled a joint line well at the southwest corner of the property and Hoyt Oil Co. drilled the center well along the south property line early in 1949. Drilling of Wellsville Oil Co.'s input wells started later in 1949. By April 1950, 12 input wells, arranged in a square pattern 660 ft. apart, had been completed. Drilling of five-spot producing wells has been delayed to permit "fillup" of the sand with water. One five-spot producing well was completed in October 1950, but by April 1, 1951, no other new producing wells had been drilled. The input wells are completed with $1^1/_2$-in. cement-lined tubing set on rag packers and cemented at the top of the oil sand. The input wells were not shot.

Injection was started into the Cooperative Refinery Association wells late in 1949 and into five or six of Wellsville Oil Co.'s inside wells in February 1950. A pressure of 1,200 to 1,300 psi. was applied at the well heads of seven wells to start water injection. Wellsville Oil Co.'s other input wells initially took water at pressures of 500 to 600 psi. Under normal conditions of operation, pressures at the input well heads ranged from 330 to 500 psi. on April 1, 1951, to inject an average of 350 bbl. of water per well per day.

Water-Pressure Plant

Water for injection is pumped from the Caney River into two settling ponds and is treated with 15 to 60 lb. per day of Treat-Rite Chemical Co. Formula 110. The amount added depends upon the condition of the river water. One gallon per day of chlorine (Klenzdale xy-12) is added to control the growth of organic matter. Fig. 3 is a flow diagram of the water-treating and injection system. One Aldrich triplex pump powered by a 50-hp. diesel engine was used to inject about 3,500 bbl. of water daily. A second Aldrich triplex pump was placed in operation in April 1951. The new pump has a capacity of 7,500 bbl. per day and is powered by a 50-hp. Superior gas engine. This pump will supplement the original pump to flood the remaining 60 undeveloped acres.

Injection operations.—When water flooding was started in February 1950 there were 15 Bartlesville sand and 10 Wayside sand wells on the 2 leases. However, only a few of the e wells were pumped regularly. During the next few months several temporarily abandoned wells were reactivated. Monthly oil production increased from 50 bbl. in January, to 225 bbl. in June 1950. In July 1950 the operation of 11 old wells, both Bartlesville and Wayside sands, was discontinued. In October a five-spot oil well was drilled southeast of the plant. Completion of this well and a change of pumping time on another well resulted in an increase in rate of oil production in November 1950 to about 250 bbl. per month. Late in 1950 all but two of the old producing wells were abandoned. During the first quarter of 1951, two old and one new Bartlesville sand and two Wayside sand wells (Fig. 1) were being operated. Bartlesville-sand wells are pumped about 1 hour daily by individual units powered by gas engines. The Wayside sand wells are pumped about 1 hour three times a week.

The first increase in the rate of oil production attributable to water injection was noticed during January 1951, 11 months after water was first injected. By the end of March 1951 oil production from the three Bartlesville wells averaged 15 bbl. daily. About 892,300 bbl. of water had been injected into the Wellsville Oil Co.'s 10 input wells by March 31, 1951, and 2,769 bbl. of oil had been recovered since the flood started. Of that quantity of oil only 569 bbl. is considered to be attributable to water flooding.

Plan Your Personnel Requirements

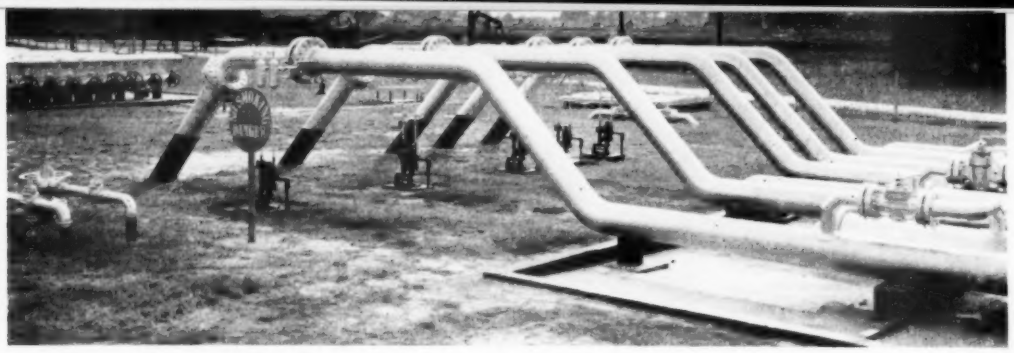
(Continued from page 77)

they can handle. A catalog of unused skills may not seem of much purpose at the moment, but it will solve many problems which arise overnight.

With all jobs listed on a job-analysis sheet you can decide on a training timetable to cover up weak spots. Seek to develop all-around men who can step into unexpected vacancies with a very short breaking-in period. This training program will require both time and money, but it greatly reduces the probability of future emergencies. By explaining the reasons for the steps you are taking, you'll receive a higher degree of cooperation from everyone concerned. Let your help know about possible changes coming up and give them credit when it's due.

In fact, every effort should be made to let workers know how they're getting along and in other ways build up plant morale. Labor turnover and absenteeism will become increasingly prevalent. That plant where men like to work will be the one with the most productive payroll.

In you can establish better-than-average working conditions it will also be an asset in recruiting. People naturally gravitate to a place with a good reputation for square dealing. In 9 cases out of 10, satisfied workers are the best source of obtaining new workers.



Battery of flow-meter bodies connected to orifices in raised portions of crude-oil lines at a pumping station in Texas.

Flow-Metering Practices

. . . on crude-oil and products pipe lines

by C. D. Walker*

OVER a score of years a major oil company has continuously added electric flow meters at its field and main-line pumping stations for crude oil and products, until today it has over 100 units in service. Electric meter bodies are installed on the discharge lines from diesel-driven reciprocating pumps and are connected to recorders in the telegraph operator's office at each station.

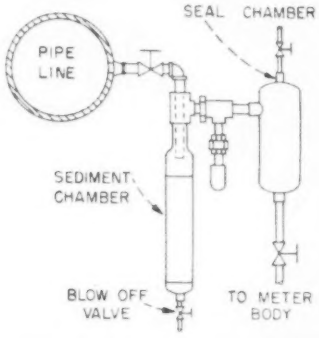
How records are used.—In conjunction with an indicating pressure gage on the discharge line, the flow recorder serves to determine whether a drop in line pressure is due to a line break or a faulty pump. Constant pressure drops and flow indicates that the line is leaking downstream from the station. Drop in flow along with pressure places the trouble in the pumping station.

A double check on suspected line leakage is made by the telegraph operator who contacts the next station down the line. If the first station shows pressure loss but constant flow and the next station shows a drop in flow, this rechecks and immediately locates the leak. By this means, considerable savings have been realized in pumping time and man-hours.

Location sustains accuracy.—The metering orifice is located in a raised section of pipe to improve the installation. With the meter body thereby placed below the orifice, any accumulated air in the connecting piping or meter body is vented automatically. Accuracy of the meter is thus maintained. The average distance between the meter body and recorder is about 500 ft. although in some installations it is as high as half a mile.

Connections and meter body.—In the accompanying close-up view of the meter-body installation may be seen the piping connections employed at a typical pumping station. As is common practice with crude-oil flow meters, seal chambers at the top of the meter-body connecting lines are filled with a 50-50 mixture of glycerin and water to prevent contact of the oil and mercury in the meter body. This avoids troublesome emulsification of the oil.

*Application engineer, Minneapolis-Honeywell Regulator Co., Brown Instruments Division, Houston.



Arrangement of special piping for metering of crude oil containing suspended particles.

On certain installations, where suspended particles in the crude oil present a difficult meter-maintenance problem due to clogging of the connecting lines, a special piping arrangement is employed. Each connection from the pipe line extends down into a sediment chamber which accumulates any foreign matter or scale and prevents it from passing into the seal chamber, and thence into the meter-body connecting line. Periodically, a globe valve on the bottom of the sediment chamber is opened and the scale blown out, thereby avoiding the time-consuming task of disassembling the piping and cleaning out the system with gasoline.

Closeup view of flow-meter installations showing seal chambers and piping connections for orifices and meter bodies.

Station control room. Instruments on panel board in background are flow recorders and indicating pressure gages.

COLD-SEPARATION PROCESSING

Nontechnical question-and-answer discussion of new procedure

Q: You were talking generally about approximate heat-exchanger predictions for making estimates concerning cold-separation applications. Could you describe the working arrangement of a typical cold-separation heat exchanger?

A: Yes. The heat exchanger which we are talking about is, as you will recall, an annular type. That is, the warm well stream passes through a high-pressure tube, or tubes, enclosed in another tube. Cold gas is caused to flow in the annulus between the two tubes and in so doing absorbs heat from the well stream. This results in the cooling which we require for the well stream.

Schematically, one basic pass of the heat exchanger may be represented as shown on Fig. 5. Note that the hot well stream flows in one direction and the cold gas flows in the opposite direction through the annulus. For obvious reasons this is referred to as a counter-flow type of heat exchanger. The amount of heat exchange is, among other things, dependent upon the temperature difference between the cold gas in the annulus and the hot well stream within the inner pipe at any point along the exchanger. Notice that with the counter-flow type of heat exchanger this difference in temperature tends to stay somewhat the same along the length. As the cold gas moves in the annulus from right to left and tends to become warmer, it is successively in association with well stream which is hotter if we consider samples of it closer and closer to the left, or inlet end.

This is the second and final part of an article which presents a nontechnical discussion on an important field processing operation. Here the author, Judson D. Lowd, Parkersburg Rig & Reel Co., takes up the application of heat-exchange equipment in the cold-separation process. Also included here is an economic analysis of the well-head method for removal of hydrates in natural-gas-production operations.

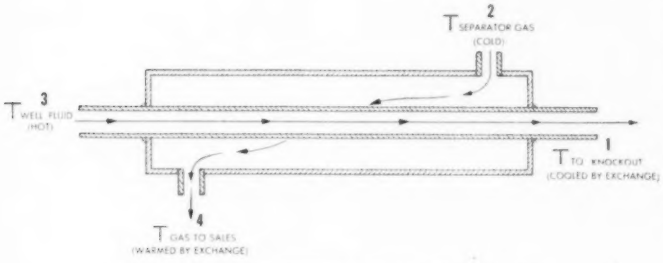


Fig. 5—Schematic arrangement of one-pass heat exchanger.

Q: I believe I see the general arrangement for heat exchange. You previously gave a rough rule for checking to see if my heat exchanger, with the same nominal capacity as the over-all cold-separating rig, was more than adequate to produce required cooling under given conditions. But you can give an estimation rule of thumb which will show me when heat-exchange capacity may be inadequate at conditions short of the nominal capacity of the over-all cold-separation assembly, if so, how inadequate, when the next assembly size of exchanger may be required, and what the warmed tail-gas temperature from the exchanger may be in various cases?

A: Sorry, that's too big an order. But some of those things can be in-

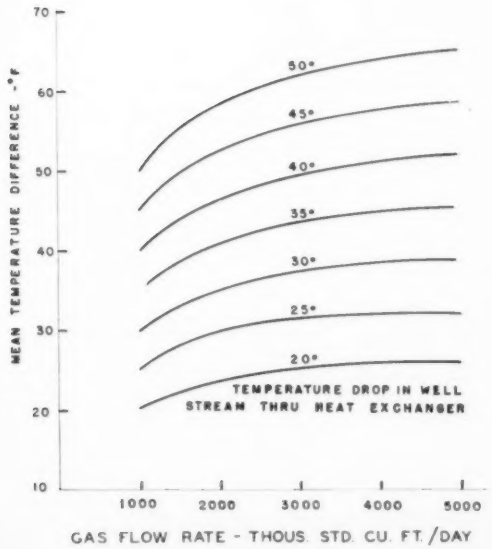


Fig. 6.

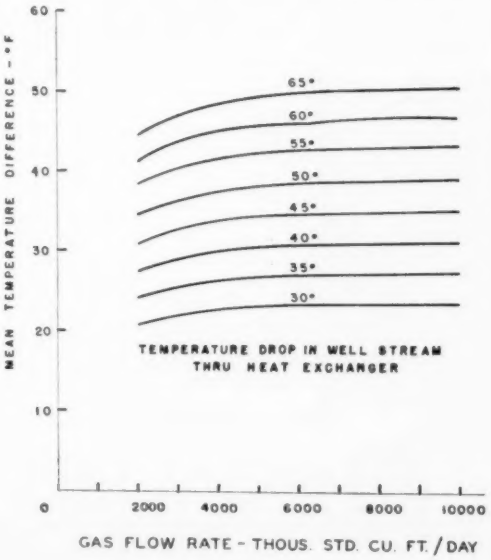


Fig. 7.

dicated to you by the following—which again you must recall is liable to major exceptions of which you must be wary. Heat-exchange specialists would scalp us both for placing more than just passing reliability on such discussion as this which so glibly "averages out" dozens of variables we fail even to mention. Nevertheless this will be helpful in guiding your judgment when cold-separation applications are being made.

To pursue our rule of thumb it is then necessary to determine the average temperature difference which exists along that inside pipe between the hot well stream and the cold separator gas. The design of the heat exchanger—within the capacity of the over-all cold-separation unit—provides for a certain minimum difference for average flow conditions. If we make a rough check to see that this minimum is maintained, we will have another indication that the heat exchanger under our specific conditions will be adequate up to the rated capacity of the over-all unit. The procedure is this:

1. Assume that the heat exchanger is adequate under the conditions which we are investigating. If this is so, then the heat exchanger must have the capacity to push the well-head temperature down to some desirable water-knockout temperature. We can therefore assume that the water-knockout temperature is, say 85° F.

2. Using the desirable water-knockout temperature which we assume will be obtained, determine the probable temperature of the gas in the high-recovery separator by noting the pressure drop between water-knockout and separator and applying the rule of thumb discussed earlier. This will be the temperature noted at "2" in Fig. 5.

3. The temperature at "3" is that of the well stream less the number of degrees lost while the well fluid does its heating job in the coils of the high-recovery separator. To be on the side of conservatism, assume that this temperature is the full temperature of the well stream. This safety factor in our temperature assumption will tend to offset errors made in the estimate of what flowing temperatures will actually be. Such estimates are frequently low.

4. Find temperature "4" by the rough assumption that the cold gas passing through the heat exchanger will be increased in temperature $1\frac{1}{2}$ times as many degrees as the well fluid is reduced in temperature. You can readily see how the cold gas will be raised further than the well stream will be reduced because of the comparative weights and characteristics of the two streams. The $1\frac{1}{2}$ factor is just a rough average for our purposes here.

5. Find the difference between the knockout temperature "1" and the separator temperature "2."

6. Find the difference between the well-stream temperature "3" and the sales-gas temperature "4."

7. Now find the average of these two differences at the opposite ends of the heat exchanger.

8. If this average difference exceeds 45°, we can assume that under the conditions we are investigating the heat exchanger will be adequate to produce a minimum safe knockout temperature within the rated capacity of the cold-separation unit.

The foregoing, of course, cannot be construed necessarily to mean that if the temperature difference is less than 45° F., the exchanger will not be adequate beyond some capacity less than the nominal rating of the over-all unit and its standard exchanger. A more detailed check on any exchanger can be made by reference to estimation charts similar to the typical ones shown in Figs. 6 and 7. These may be available from the manufacturer or they may be prepared by you from actual field experience while using a given exchanger under various conditions.

By the above-outlined method, you can approximate the mean temperature difference in the exchanger and figure the temperature reduction which will necessarily obtain through the exchanger. (Temperature 3 minus temperature 1). With these figures and the charts you can predict at what top capacity the exchanger will start to become inadequate. You can assume a higher knockout temperature, and follow through to see what the top capacity under those revised conditions will be; then determine the separator-gas temperature and the economics of the whole system under the revised conditions. If nothing else, a study of these charts with respect to some typical assumed well flowing conditions will give you an excellent insight into the matter of expected results that can be obtained from heat exchangers of this type using as their cooling medium a gas which depends partially for its very coolness upon the initial effectiveness of the exchanger.

Q: When we took the average tem-

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perature difference—(7) above—between the cold gas and the warm inlet stream through the heat exchanger, we figured just a straight arithmetic average. Is that actually correct?

A: No, but it is close enough for our purposes when the difference in the temperatures are relatively small. Actually we should have determined the logarithmic mean temperature difference. For purposes of this rule of thumb, the arithmetic mean is sufficiently accurate.

Change of flow rate changes application conditions.

Q: You continue to mention the fact that the temperatures and pressures required as part of application data must be related to flow rate. Why is this so necessary?

A: As you know, the greater the rate at which we withdraw fluid from the well the lower the flowing pressure becomes. Also, the greater the rate of withdrawal from the wellhead, the higher the flowing temperature becomes. Now let us first consider temperature variation with flow rate and look at Fig. 8. You will recall that in our first basic application problem we talked about the condition where we were flowing 2,500 M.c.f. with a well temperature of around 100° F. This was condition "A" on this chart. At that condition we figured that the separator temperature would be 33° F. and that our recovery would be somewhere around 8 per cent more than that which would be recovered with conventional equipment.

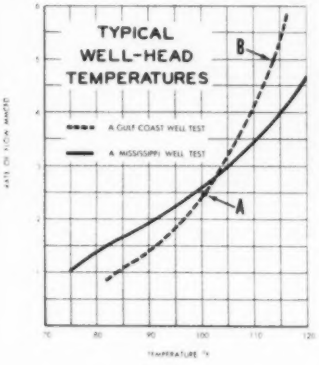


Fig. 8.

Let us now say that this particular well is called upon to flow at a rate of approximately 5,000 M.c.f. for some period of time. Notice that instead of having a well-head temperature of 100° F., we have a temperature of 113° F. You will therefore see that cold separation applied only under consideration of the conditions of point "A" and actually used under the conditions of point "B" will instead of having a separator temperature of 33° F. have a separator temperature of something in the neighborhood of 46° F. Therefore the increased recovery over conventional equipment will be only 4 per cent instead of 8. You can readily see that variation of flow rate must be taken into consideration when we are applying any type of cold separating equipment.

Q: In that discussion you, of course, assumed that there would be no additional external heat exchanger in play?

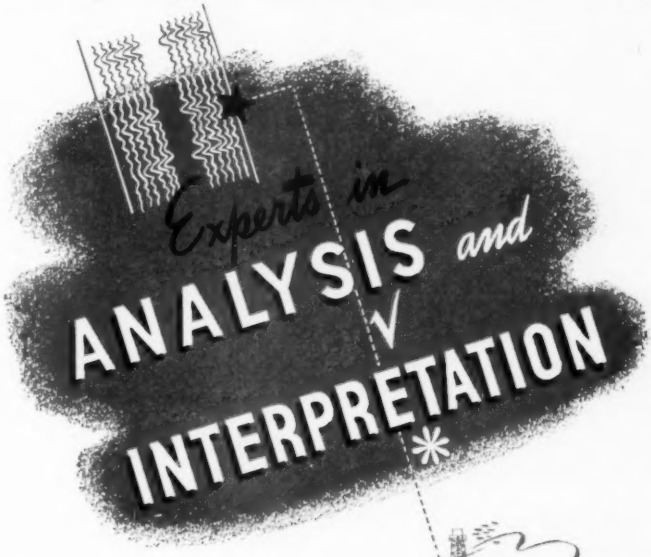
A: Yes, we did. In fact, it brings us to another point which illustrates one type of application in which a heat exchanger is particularly advantageous.

Q: I believe I can see the case already. Whenever the rate of flow is going to vary quite widely, it would seem that a heat exchanger is particularly desirable. In this case, for instance, the heat exchanger would probably have been inoperative at case "A" and we would have had a separator temperature of 33° F. However, when the rate increased to 5,000 M.c.f. and condition "B," the heat exchanger would have gone into action and removed 13° F. or so of temperature, giving us the same separator temperature under a considerably different inlet condition.

A: That explained exactly what I was about to point out.

Q: Well, that covers the variation of temperature at flow rate. Now what about pressure?

A: In many cases, the variation in



But what is an expert? Webster says, "one who has a special skill or knowledge; a specialist." Certainly that includes the Republic personnel. Backed with the newest and finest equipment, much of which they themselves designed and manufactured, plus the experience in many years of successful exploratory work, Republic's Supervisors and Party Chiefs offer the producer the maximum in reliable analysis and interpretation.

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pressure with the normal variations in flow rate are not extremely large. However, you can readily see that it is important to consider the variation in pressure because if this falls very much at the same time that temperature increases, it gives you a compound effect on the expected temperature in the high recovery separator. That separator temperature is, after all, the factor which determines the economics of the application. That is, if the pressure falls, then you have less pressure drop available and less cooling effect in the choke. At the same time you may have a higher starting temperature. These two conditions can frequently compound to make an arrangement such that application may be extremely sound at a 2,000 M.c.f. rate and be an extremely bad one at a 6,000 M.c.f. rate.

You can see that if the well you are talking about is one that is going to be called upon to deliver a wide variation in flow rate and if it is concurrently a well that appears to pull down in pressure rather materially over this variation in flow rate, then you will have to be particularly careful in considering the conditions at the higher rate. In a word, it is highly desirable to apply your rules of thumb to extreme conditions as far as rate flow is concerned.

Temperature is a key to effective water removal at high pressure.

Q: We have discussed the fact that there is a certain minimum temperature below which we cannot operate the water knockout without danger of hydrate formation in this separating device. Is there also a maximum temperature beyond which this water knockout may not be operated satisfactorily as part of the cold-separation system?

A: Yes, the higher the water-knockout temperature above the safe minimum temperature, the less effective is the water knockout at removing liquid water from the system before the well stream enters the choke.

Q: Frankly, I thought that I was pretty sharp on this water removal portion of the cold-separation cycle but I believe you had better go into detail on that again.

A: First please refer to Fig. 9. As we mentioned before the gas in the reservoir is associated with water. This gas therefore picks up and saturates itself with as much water as it can hold at the temperature and pressure in the reservoir. Fig. 9 shows us about how much water vapor the gas can hold under various temperatures and pressures. Let us say that in this case the pressure in the reservoir is 4,000 psi. and the temperature is 220° F. You will note from the chart that the gas can therefore hold 40 gal. per million cubic feet. That is, there is vapor water saturating every million cubic feet of the gas and this vapor would turn into 40 gal. of liquid if all of it were condensed.

Q: So now the gas starts coming to the surface and its pressure and temperature are reduced. What then?

A: Let us assume in this case that by the time the well fluid gets to the surface its pressure is 3,500 psi. and its temperature is 90° F. You will note from the chart that at 3,500-psi. pressure and 90° F. temperature gas can only hold about 2½ gal. of water vapor per million feet. There were 40 gal. per million feet starting up with that gas. So this means that the difference between 40 and 2½, or 37½ gal. of liquid water per million cubic feet, will have turned to liquid because it no longer can be maintained as a vapor in the gas. This is where our water knockout comes into the picture.

Q: I am back on the track again. The water knockout acts as a trap and separates these 37½ gal. per million feet liquid water from the gas stream. The only water that passes along with the gas stream is the vapor water amounting to 2½ gal. per million feet. Right?

A: Right. This is what we mean when we say the water knockout minimizes the amount of hydrates which can form in the high-recovery separator by removing the greater part of the total water content of the stream before the choke is reached. You will note that after expansion into the high-recovery separator with a temperature, we'll say, of around 38° F. and a pressure of 900 psi., that the gas can still hold 1 gal. of water vapor per million feet. That means that only 1½ gal. of liquid, or the difference between 1 and 2½, have condensed and are available as liquid to form hydrates. If it weren't for the water knockout, there would have been 39 gal. of liquid available for the formation of hydrates instead of only 1½ gal.

Q: It seems apparent that the cold-

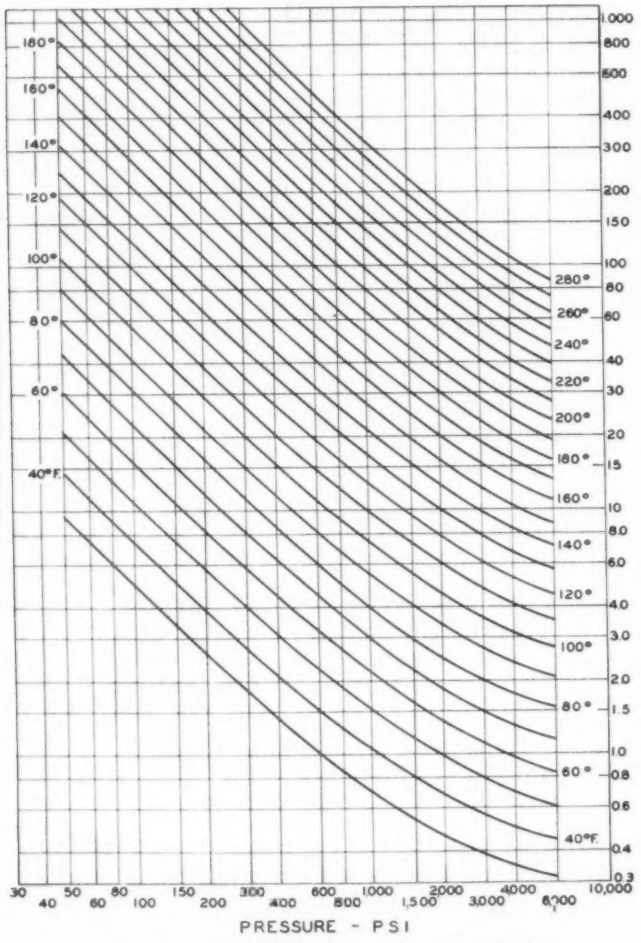

Fig. 9—Chart for estimating moisture content of saturated gas.

er the knockout the greater the amount of liquid water which can be removed from the stream for any total water content as determined by reservoir conditions. Is that right?

A: Yes. Of course there is a limit to that and we have discussed this. The limit to coldness is the temperature at which the liquid water in the well stream forms hydrates before it can be separated.

Dehydration of gas from cold-separation units is considered.

Q: We have had considerable discussion about increased recovery from cold-separation units. Would it be possible for us now to discuss the dehydration of which these units are capable?

A: Dehydration by a cold separation unit is sometimes considered a "byproduct" as far as the basic principle is concerned but in many applications this byproduct is actually the basic requirement. Fig. 9 will again give you the answer to this question.

Let us consider separator operation again at 900 psi. There is always water—however little—in association with the gas in conventional separators. Therefore the gas that leaves the separator will be saturated with as much water vapor as it can hold at the temperature and pressure of the separator. If, for instance, the separator were operating at 900 psi. and 60° F. the gas leaving that vessel would contain roughly 2½ gal. per million total water content. This water would be available to condense later on in the system as the temperature became lower. Once having condensed into the liquid state, hydrates could form.

Now let us consider the same separator operation at 900 psi. and 30° F. temperature. Notice that the gas leaving that separator could only handle about 0.7 gal. per million cubic feet of vapor water.

Q: In the case of that separator you spoke of which operated at 60° F., if the gas emanating from it at any point downstream dropped to a temperature of below 60° F. at the same pressure, we would begin to have condensation and the possibility of hydrate formation. It would therefore seem if you can operate the high-recovery separator at a temperature lower than the lowest expected line temperature that there could never be any possibility of hydrate formation because there would never be any water condensed. Is that right?

A: Yes.

Q: Is it always true that the dew point of the gas emanating from a separator should be the same as the temperature of that separator if the pressure is the same?

A: For conventional separators this is true. The dew point is the temperature of the separator because the gas which leaves the separator is saturated with as much water vapor as it can hold at that temperature, the liquid portion having been removed

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by mechanical separation. If the temperature of that gas stream is reduced at all then some of the water vapor content will start to condense which by definition means that we have dropped below the dew point.

There is a very important exception to this when we are talking about high-recovery cold separators, however. Please look at Fig. 10 and we

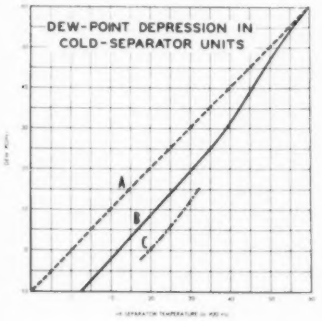

Fig. 10.

find this to be true. Take for an example the separator operating at 900 psi. and 30° F. temperature. If we determine the dew point of the tail gas we would expect it to be 30° F. However, in actual fact the tail gas from that separator must be cooled to 20° F. before it will condense any liquid water. That is, instead of a 30° F. dew point it has a 20° F. dew point.

Q: That would indicate that there is a desiccant somewhere in the system which has taken some actual water vapor out of the gas.

A: Yes, that is the way it appears. There have been several explanations of this phenomenon and so probably the correct answer is some representative part of all those explanations. It has been presumed in one instance that possibly the temperature in the vessel, at the point where expansion takes place and initial separation is accomplished, is considerably lower than the average temperature of the tail gas. That would mean that the temperature at which equilibrium with water vapor was established would be lower than the indicated gas temperature of the separator at which our dew point was taken. A dew-point depression would then seem apparent but would not actually be the case simply as a result of our not being able to properly measure existing separator temperature. Then, too, individual measurements of dew points are always subject to rather large errors.

Most are inclined to feel, however, that there is a real dew-point depression as a result of the high-recovery separator operating far below the hydrate temperature. Hydrates — however few—are thus actually forming inside of the separator. It is believed that the natural-gas hydrates have an absorptive, or adsorptive, capacity to remove water vapor from a gaseous mixture passing over them. As you know, some very interesting laboratory observations have been made by specialists in this regard some time ago and they substantiate this general idea.

Again looking at Fig. 10, you will note that there is no dew-point depression once the gas temperature in the separator reaches 59° F. This tends definitely to substantiate the idea that the hydrates do have a desiccant effect. Fifty-five degrees is the expected hydrate temperature at the pressure of the separator and above this temperature there are no hydrates formed. Thus if the theory is correct, you would expect that there would be no dew-point depression above that temperature. Such is indeed the case. We, as well as others, have prepared similar curves on high-recovery separators operating at varying pressures and find that the same general shape pattern obtains but the temperature point at which no dew-point depression exists moves upwards with pressure essentially the same as does the hydrate expectancy temperature with pressure.

We do not want to go into detail in this regard because it constitutes a full discussion in itself. Suffice it to say, however, that the amount of dew-point depression which can be

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expected from separators operating below the hydrate range seems definitely to be a function of the physical design of the separator itself. While Curve "B" is an average curve for separators from which data was taken, Curve "C" was plotted and is reproduced in part on the basis of operation in a separator which was particularly designed with the dew point depression effect in mind. Further, we have considerable field data which indicates that other types of separators will produce dew point depressions considerably less than the average Curve "B." Here again we refer you to the recent paper by Seely and Records in which you will find several dew-point depression plots from detailed measurements under specific conditions on one location.

This whole matter is a very important consideration because it means that the dehydrating capacity of a cold separating rig is considerably more than would be indicated by the single fact that the separator is operating at a low temperature.

For the moment we suggest use of the average Curve "B" for predicting dew point at pressures of 1,000 down to 600 psi. or so.

Q: Some time ago you said that we would work out an over-all example which would employ all of the conclusions drawn from the discussions which we have had thus far. Would it be possible to do that now?

A: Yes. So now let us list some typical data.

1. At 2,000 M.c.f. per day rate:
   (a) Flowing pressure is 3,300 psi.
   (b) Flowing temperature is 100° F.
2. At 4,000 M.c.f. per day rate:
   (a) Flowing pressure is 3,100 psi.
   (b) Flowing temperature is 122° F.
3. Probable flow rate is from 1,500 to 4,000 M.c.f. per day.
4. Line pressure is 800 psi.
5. Average richness of fluid is 30 bbl. of stock-tank liquid per million cubic feet with conventional separation.

Having assured ourselves that this is a gas-well application and that the pressure differential at 4,000 M.c.f. flowing rate is 2,300 psi.—a considerable margin above our 1,200 psi. safe borderline differential—we can jump right into the application problem. It is to be noted that with change of rate over the expected range, the well does not appear to pull down in flowing pressure to the extent that this should cause an abnormal problem. Also the increase in temperature with increase in flow rate seems to be rather normal. For this application we will work to get expected results based on the worst condition which is at the 4,000 M.c.f. maximum flow rate; lowest pressure and highest temperature.

The temperatures at any rate between 1,500 M.c.f. per day and 4,000 M.c.f. per day will probably be considerably greater than desirable knockout temperature even after the well fluid passes the coils of the high-recovery separator to do the heating job. Therefore we will presume that an outside heat exchanger is necessary. The heat exchanger is especially necessary to produce constant temperature conditions at the inlet to the high recovery separator over the wide variation in flow rate.

We will select a temperature of 80° F. for the knockout and assume that the heat exchanger is adequate to produce that temperature from a 122° inlet temperature. With 80° knockout temperature at 3,100 psi. and dropping to 800 psi. in the separator, we will anticipate a 62° F. temperature reduction based on an approximation from Fig. 2. This will bring us down to 18° F. which we will round off to a probable separator temperature of 20° F. or so.

Next we will jump back and check on our heat-exchanger assumption. The cold gas to the heat exchanger will have a temperature of 20° F. Assume that there will be a rise in temperature of this cold gas equivalent to 1½ times the reduction in temperature of the hot well fluid through the exchanger. We will therefore estimate the sales-gas temperature to be approximately (122° F. — 80° F.) 1.5 + 20, or 83° F. The difference between the 80° F. fluid coming out of the heat exchanger and the 20° F. cold gas going in is 60° F. The difference between the hot well fluid entering the heat exchanger and the coolant leaving the heat exchanger is 39° F. So the average temperature difference of the two fluids passing through the heat exchanger is roughly 49° F. for estimation purposes; the straight average of 60° F. and 38° F. As this exceeds 45° F., we may presume that our assumption that the heat exchanger would be adequate to hold the knockout temperature at 80° was correct.

Under conventional conditions, the separator would probably operate at 60° F. and in our case the separation is accomplished at 20° F. Assuming a conservative average increase in production of one-third of 1 per cent per degree temperature difference between the two types of separators, we will come up with a probable increase of about 13 per cent. For 4,000 M.c.f. per day flow under conventional conditions, this well could be expected to produce 120 bbl. each day.

TABLE 1—COMPARISON OF CONVENTIONAL VS. COLD-SEPARATION EQUIPMENT

I.

(a) 1—650,000 B.t.u. indirect two-pass heater with conventional accessories and 3,400 psi. coils including a gas safe-trap and regulator;
(b) 1—2-in. T-type adjustable choke;
(c) 1—1,000-psi. back-pressure regulator;
(d) 1—16-in. by 10-ft. by 1,000-psi. horizontal separator with conventional accessories;
(e) Piping and manifolding for two-staging above separators;
(300 ft. of flare line will be used for both the high-pressure and low-pressure separators but as this will be a duplication on installation of a cold-separation unit, we will omit these since they are common and cancel each other. This will hold true also on the flow line from the low-pressure separator to the tanks.)
(f) Labor to lay and bury pipe 18 in. in the ground, make all hookups into vessels, make forms and pour concrete, set units, and completely install all control equipment;
(g) Concrete for forms;
(h) Cost of high-pressure pipe and necessary connections, nipples, unions, etc.;
(i) High pressure block valves and regulators not furnished with equipment; and
(j) Contingencies—

Approximate total $ 8,040.00

II.

Installation to include one 3,000 psi., 5 million-cubic-feet per day cold-separation unit with six-pass by 20-ft. expansible heat exchanger, back-pressure regulator, low-pressure separator, but less meter run. Unit set 150 ft. from well and to include 1,000-psi. block valve, 150-ft. high-pressure flow line, connections, forms and concrete for cold-separation pillars, labor of 4 men and foreman for forms, ditching and connections, truck and driver, contingencies and insurance—

Approximate total $10,200.00

III.

Approximate difference, $ 2,160.00

TABLE 2—TYPICAL ECONOMIC ANALYSIS

	Gal. per M.c.f.	
	Conv. sep. 80° F.	Cold separation, 40° F.
1. Condensate loss in gas determined by lab test at 1,000 psi.	1.399	1.121
2. Extra recovery by operating below 80° at 1,000-psi. separator pressure		.278
3. Condensate loss by expanding from 1,000 psi. to atmosphere		.090
4. Extra recovery in tank (recovery less shrinkage)		.188
5. Total condensate recovered in tanks (Item 4 plus 1.203)	1.203	1.391
6. Total shrinkage .488 plus Item 3)	.488	.578
7. Total condensate at 1,000 psi. separator pressure (Item 5 plus 6)	1.691	1.969
8. Total condensate brought to well head (Item 1 plus 7)	3.090	3.090
9. Total bbl. per day recovery in tank at 4 oz. at rate of 4,000 M.c.f. per day	114.7	132.6
10. Extra recovery operating below 80° in barrels daily		17.9
11. Per cent increase operating at temperature below 80°		13.6
12. Gross additional revenue per day condensate value at $2.90 per barrel—dollars		$51.90
13. Operating cost, royalties, over-rides and taxes per bbl. = $1.05		$18.80
14. Net additional revenue per day		$33.10
15. No. days to pay out $2,000 total increased cost		61
16. Additional revenue obtained per month after installation paid out, prod. at 4,000 M.c.f. per day		$993.00
17. Revenue loss by more complete separation before being sent to gasoline plant		$120.00
18. Net additional revenue per month by use of cold separation		$873.00

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An increase of 13 per cent on that amount would bring us to 135 bbl. each day with the cold-separation unit, or a net liquid increase of 15 bbl. each day.

At a net of $2 per barrel, this would be $30 additional income each day or $900 for a month. In 3 months' time we would have surely grossed $2,000 extra even allowing for an average flow rate of somewhat less than 4,000 M.c.f. per day.

With 20° F. gas in the separator, from Fig. 10 we can estimate that the dew point of the tail gas is approximately 8°. The total water content of this gas would thus be about 3½ lb. per million cubic feet.

Q: You say that we will have grossed $1,800 in 2 months in this case. How much extra investment are we talking about when we put in a cold-separation unit as compared to conventional equipment?

A: With the cooperation of several operators we have made a study of the installation costs of cold-separation units as compared to conventional heater-separator hookups. Because of the completely unitized nature of the cold-separation unit, the installation is considerably cheaper and this tends to offset the increased cost of the vessels involved. As a matter of fact, the information that has been given to us by operators indicates that when compared to very complete conventional heater-separator hookups, the cold-separation unit installed costs the operator about $1,000 more. When we are talking about operators who have been putting in more simplified conventional hookups the cold-separation unit can run as much as $1,500 to $2,000 more than conventional equipment. Table 1 shows one operator's estimated comparison.

Q: So therefore if we were being conservative in considering that the installation would be costing us $2,200 more than conventional equipment, it could be said that, for this example, in roughly 2½ months we would have paid out the additional investment and that from there on the additional recovery would be straight additional income?

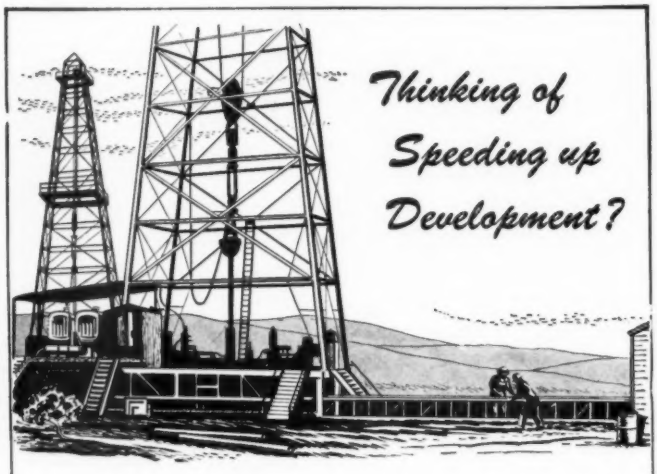
A: Yes, when the additional royalties or overrides have been paid and taken out of the gross profit involved, that would be true.

Q: Do you have a typical economic breakdown of the conventional setup versus the cold-separation setup with the details of obtaining gross additional income shown?

A: Yes. Please look at Table 2. This shows the complete breakdown in a very orderly and correct manner, which we would say was certainly on the side of conservatism.

Q: It would appear to me that we are about flanged up insofar as discussing the ins and outs of cold-separation application and operation.

A: That is one time when you are really wrong! As a matter of fact, this interview is finished for the moment. But we have only scratched the surface and set a background for future and more detailed discussion of many more considerations related to cold separation.



Thinking of Speeding up Development?

Producers of oil and natural gas are invited to consult with our Oil Department for aid in financing *accelerated development drilling programs.*

All inquiries on petroleum and related matters will receive prompt attention.

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BOOKS

A.S.T.M. MANUAL ON QUALITY CONTROL OF MATERIALS. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia 3. 100 pp. $1.75.

This manual on quality control of materials, sponsored by Committee E-11 on quality control of materials, takes the place of the widely used A.S.T.M. Manual on Presentation of Data. It is divided into three parts: Part 1, covering the presentation of data; Part 2, presenting limits of uncertainty of an observed average; and Part 3, explaining the control-chart method of analysis and methods for presentation of data.

FISCHER-TROPSCH AND RELATED SYNTHESES. By Henry H. Storch, Norma Golumbic, and Robert B. Anderson. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York. 610 pp. $9.

This book is the result of an extensive and critical review of a large number of reports and documents pertaining to selective catalytic hydrogenation of carbon monoxide, or the Fischer-Tropsch and related syntheses, for the production of aliphatic hydrocarbons and alcohols. It is a summary of work of many chemists and engineers employed by U. S. Bureau of Mines in the synthetic liquid-fuels office and by the British Fuel Research Laboratory; of special consultants from the oil, gas, and coal industries of the United States; and of German scientists and engi-

neers. Written primarily for chemists and chemical engineers engaged in Fischer-Tropsch or similar process development, this book presents basic chemistry of process, results of catalyst testing and pilot-plant development work, and data on industrial operations. Laboratory and industrial development of the Ruhrchemie process, as well as more recent pilot-plant developments in Germany and in the United States are reviewed. Various Fischer-Tropsch processes are classified according to physical form of catalyst and method of removal of heat of reaction. Related processes such as the oxo and isoparaffin syntheses are discussed. Kinetics and reaction mechanism are thoroughly covered. Profusely illustrated, the book contains 74 graphs and 36 tables.

PRACTICAL OIL GEOLOGY, sixth edition. By Dorsey Hager. Published by McGraw-Hill Book Co., Inc. 589 pp. $7.50.

Now in its thirty-sixth year, this book is clear, concise, and practical. It shows how geology can aid in the finding and in the development of natural gas and petroleum. The methods of searching for gas and oil in new untested areas, the selection of wildcat locations, the application of geology in drilling, the value of geology in the production of oil and gas are covered in this revised addition. The book gives a well-rounded picture of the value of geology to the oil business for the driller, oil operator, and mining engineer. Ready answers to questions and problems are provided by discussions that begin with the origin and accumulation of petroleum, through the problems of producing oil, to the new fields of work for petroleum geologists and geophysicists. In it you'll find facts and data on such topics as the chemical composition and properties of oil, the geologic structure in which oil occurs, fossils and their use, a discussion of gas and oil traps, the geological factors to consider in drilling, and the methods of estimating recoveries. The book also gives valuable information and reference material on the relationship of water to oil and its effect on oil sands; natural gas and gasoline, including its composition, origin, etc.; and analyses of oil shales.

Catalyst Air-Lift System

(Continued from page 67)

it is necessary to remove carbonaceous deposits which it accumulated in the reactor.

Kiln.—The catalyst is piped from the reactor to the regenerator. Uniform removal of the combustible deposits on the catalyst is provided for in the kiln or regenerator. Operating temperature of the kiln is carefully controlled to prevent deactivation of the catalyst.

Air at a pressure of about 2 psig. is introduced near the middle of the regenerator. Part of the air passes upward through the descending catalyst and is removed from the top of the kiln as flue gas. The other portion of the air flows downward with the catalyst, over rows of cooling tubes, and is disengaged for disposal. The incoming catalyst containing maximum carbonaceous deposits is met by a stream of flue gas low in oxygen content. The outgoing catalyst temperature is controlled to obtain the desired severity of cracking.

The catalyst reaches a peak temperature just before the introduction of the cool combustion air. This incoming air reduces the catalyst temperature, but combustion in the lower section of the kiln gradually raises it to another peak before it passes over the cooling coils. The cooling coils serve to remove heat of combustion and to lower the temperature of the catalyst for introduction into the lift pot. At the same time temperature of the flue gas is reduced, suppressing any tendency towards afterburning and increasing thermal efficiency. Treated water is circulated through the cooling coils, generating steam from the heat removed at this point.

Meter boxes.—Meter boxes are provided for positive measurement of the flow of catalyst from each section of the kiln. These meter boxes are vented to atmosphere and access covers are provided for observing the flow of catalyst or for removing samples. The lift system can be adjusted to maintain the desired flow in the various sections of the kilns.

Other equipment. — The catalytic section includes low-pressure single-stage, centrifugal blowers to supply air for the catalyst lift and for regeneration plus a steam drum. Air heaters are used to provide heat for initially warming the unit; they may also be used to heat lift and combustion air by direct combustion of fuel.

Package Unit

A "packaged" air-lift T.C.C. unit

One System for Complete PARAFFIN CONTROL

FOR ROD WELLS-SURFACE LINES-FLOWING WELLS

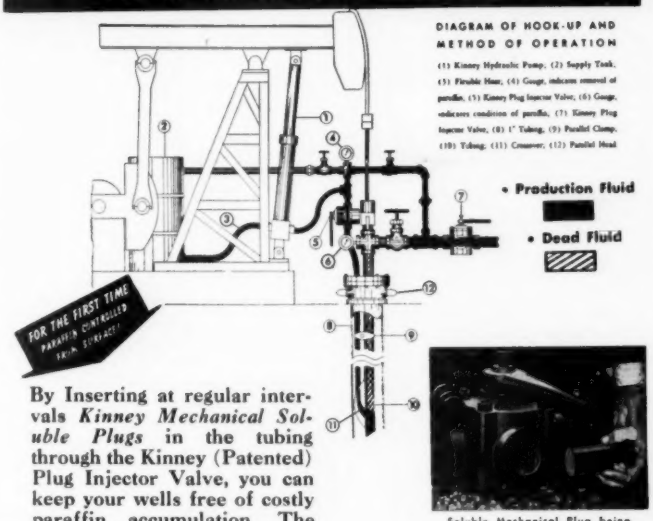
DIAGRAM OF HOOK-UP AND METHOD OF OPERATION
(1) Kinney Hydraulic Pump, (2) Supply Tank, (3) Flexible Hose, (4) Gauge, indicates removal of paraffin, (5) Kinney Plug Injector Valve, (6) Gauge, indicates condition of paraffin, (7) Kinney Plug Injector Valve, (8) 1" Tubing, (9) Parallel Clamp, (10) Tubing, (11) Crossover, (12) Parallel Head
• Production Fluid
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By Inserting at regular intervals *Kinney Mechanical Soluble Plugs* in the tubing through the Kinney (Patented) Plug Injector Valve, you can keep your wells free of costly paraffin accumulation. The entire operation is CONTROLLED FROM THE SURFACE. Requires only one man to operate the Kinney System. Saves Time and critical materials. Major and Independent Operators say "It's the simplest and most practical method for Paraffin Control". Let us show you full details.

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ENGINEERING News

KEY APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT •

Efficient Gasoline Sweetening Process Uses Eductor to Mix Slurry with Petroleum

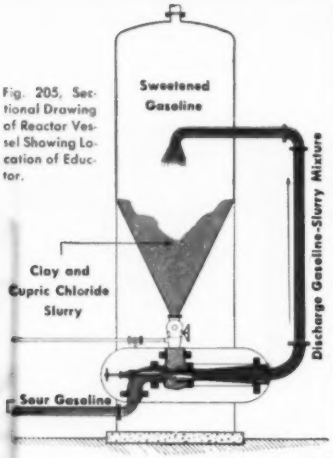
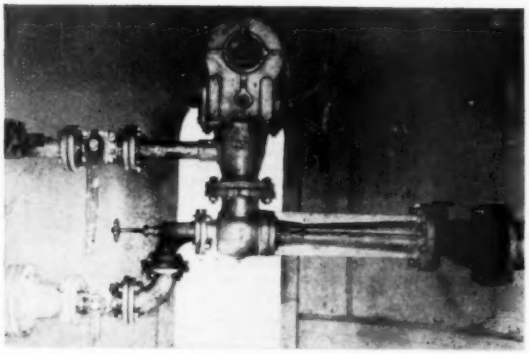


Fig. 205, Sectional Drawing of Reactor Vessel Showing Location of Eductor.



SK 4" Fig. 205 Jet Eductor Used to Mix Distillate and Cupric Chloride Slurry.

A recent issue of OIL & GAS JOURNAL contained an article which described, in detail, a significant application of the copper sweetening of sour gasoline at the El Dorado, Kansas, refinery of Skelly Oil Company.

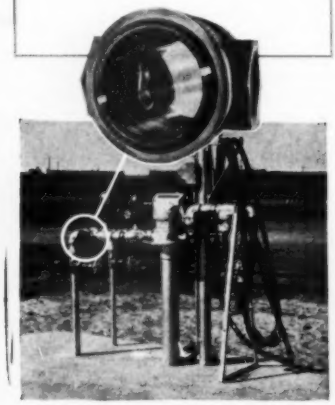
As a part of this process, Skelly engineers have incorporated an SK Fig. 205 Jet Eductor to entrain and mix slurry with liquid and discharge against counter pressure—an operation for which this type of eductor is particularly well adapted. The eductor is located at the base of the cupric chloride reactor at the apex of the conical bottom of this vessel.

As shown in Fig. 205, the material to be treated—distillate which has been made moisture-free in a salt tower and which has been heated above initial temperature in a heat exchanger—is used as the pressure liquid. The velocity of the distillate issuing from the eductor nozzle entrains the slurry reagent—a mixture of Attapulgus clay, cupric chloride crystals and water—and the two are mixed intimately in the throat of the eductor. The mixture issues from the eductor into a transfer line which leads back into the reactor where the mixture is discharged. Action is continuous.

The treated distillate, taken from the top of the reactor vessel through a 4" pipe, is later washed with water, separated from the water in a settling tank, and is then moved to a second salt tower where any remaining traces of water are removed. From here, the sweet, treated product goes into storage.

For complete details on all types of SK Jet Eductors and their characteristics, request Bulletin 2-M.

SK Flapper-Type Flow Indicators indicate flow of a gas or liquid by means of a hinged flapper. They are widely used on butane-propane service to show flow or to indicate leaks. *Available from stock, this type of Flow Indicator and other types are described in detail in Bulletin 18-H, copies of which are available upon request.*



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REPRESENTATIVES IN PRINCIPAL CITIES

has been designed by Socony-Vacuum in addition to the standard 15,000-bbl. per day units. Designed for capacities below 6,000 bbl. per day, the same moving bed and air-lift principles are employed by these units.

By means of standardization and prefabrication of various vessels and other equipment, the investment cost per barrel of feed capacity will be in line with the larger units. This makes available to small refineries the same features of the large units.

The catalytic section of the new units can be erected entirely within a standard 195-ft. oil-field-type derrick. The derrick serves as a construction rig while the plant is being erected since vessels are designed so they can be lifted into place within the derrick. The entire unit is designed to occupy an area 150 by 200 ft.

Operation of First Unit

Early in October 1950, the first Socony air-lift T.C.C. unit went on stream at Beaumont. Few operational difficulties were encountered during the first 2 weeks but catalyst attrition rate was higher than anticipated. The unit was shut down to make minor alterations to the air-lift system. During this period a catalyst dryer was fabricated and installed since a large proportion of the catalyst breakage was due to the high moisture content of fresh catalyst.

Shortly after the unit was put back on stream, the charge was changed from Mirando and Placedo crudes to a vis-breaker gas oil for which the unit was designed. Yields, operating conditions, and physical tests representative of a recent day's operation are shown in Table 1.

During this period the unit has been operating at low severity to produce maximum No. 2 fuel oil. An initial limitation on the throughput of the unit was the top reactor pressure, which has been run considerably over that of design. This pressure has been high because of excessive pressure drop in a line from the overhead condenser to a gas separator. The high line pressure drop was corrected during the first shutdown.

The unit was started up with 37 AI chrome bead catalyst. Activity of the catalyst is declining at an abnormally slow rate and it is anticipated that these air-lift-type units will be characterized by higher equilibrium catalyst activity than the earlier T.C.C. units. It is planned to use catalyst of lower activity in starting up subsequent units.

Curves shown in Fig. 2 indicate the charge rate to the reactor and the rate of catalyst attrition. Operational difficulties resulting from freezing weather and equipment difficulties have resulted in some intervals of high catalyst makeup since November 1. The general trend of catalyst attrition rate declined during the first few months of operation. Present research in catalyst breakage and lift design may bring the catalyst attrition rate to below 2 tons per day.

Prime contractor for the three Beaumont units is Lummus Co. Major subcontractors include: John Dollinger, Jr., Inc. (steel fabrication); Wyatt Boiler & Metal Works (steel fabrication and vessels); Consolidated Western Steel Corp. of Texas (vessels); and Allis-Chalmers Manufacturing Co. (blowers).

Rowan Launches 20,000-ft.-Capacity Drilling Barge

ONE of the largest submersible drilling barges yet built has been launched by Avondale Marine Ways, Inc., for Rowan Drilling Co., Inc., of Fort Worth. The new barge measures 200 ft. long by 54 ft. wide and is equipped for 20,000-ft. drilling. The barge is the third one built by Avondale for Rowan in the last year. The basic engineering of this barge is similar in many respects to those previously built for Rowan. However, it is considerably larger and is a completely self-contained unit.

It is capable of carrying a full complement of drilling personnel, supplies of pipe and other equipment, and a full load of fuel and fresh water. All this can be carried on the barge between locations obviating the necessity of any unloading. Rowan's huge barge has a draft of only 6 ft.

The 20,000-ft. barge has been christened the "L. J. Hartmangruber" and was sponsored by Mrs. Hartmangruber, wife of the division superintendent for Rowan Drilling Co. Among the Rowan personnel who attended the launching ceremonies were M. G. Rowe, vice president in charge of drilling operations; C. W. Yancey, division drilling superintendent, and J. C. Magner, assistant superintendent.

Diesel-Electric Power to Be Used

Drilling equipment on the Hartmangruber will be diesel-electric powered and total generating capacity is rated at 1,200 kw. Five Cooper-Bessemer diesel engines are the basic power source. These include one Type FW8 supercharged 675-hp. engine, driving a 400-kw. generator, and four Type FP8, 375-hp. engines, each driving a 200-kw. generator.

All electrical equipment on the Rowan barge is manufactured by Westinghouse Electric Corp. A central control panel is provided for operation of the major power units.

An Emsco draw works is installed on the barge, and also one E700 and two C350 Ideal slush pumps.

A feature of the Hartmangruber is the derrick-floor elevation of 20 ft. This elevation gives a 14-ft. clearance under the rotary beam allowing sufficient space for ease of handling and installing high-pressure well-head control equipment.

This 200-ft.-long submersible drilling barge recently launched by Avondale Marine Ways, Inc., for Rowan Drilling Co., is one of the largest ever built.

CORROSION and its control

Measurement of Electrical Constants of a Pipe Line

IN installment 6 of this series five electrical constants of a pipe line were listed, as follows:

R_s = structure resistance in ohms per kilofoot.
R_l = leakage resistance, in kilofoot-ohms.
R_g = ground resistance, in ohms.
R_k = characteristic resistance in ohms.
α = attenuation constant, per kilofoot.

These five constants are not independent; they are connected by the following relationships:

$$R_k = 2R_g \quad (1)$$

$$R_k = (R_s R_l)^{1/2} \quad (2)$$

$$\alpha = (R_s / R_l)^{1/2} \quad (3)$$

$$\alpha = R_s / R_k \quad (4)$$

Only three of these equations are independent, since Equation 4 can be derived from Equations 2 and 3; therefore we must know two of the five quantities in order to find the other three. The two most easily determined are R_s and either R_k or R_g. R_s, the structure resistance, may be approximated by:

$$R_s = 0.252 / W \quad (5)$$

where W is the weight of the pipe, in pounds per foot.

The constant in Formula 5 varies slightly with different grades and heats of steel; if more precision is desired, or if the pipe weight is unknown, R_s may be determined by direct measurement as shown in Fig. 1. Connections C_1 and C_2 may be made through valves or risers, but e_1 and e_2 must be placed so that there are no fittings between them. A potentiometer or potentiometer-voltmeter should be used to measure E; current may be supplied by any convenient source, such as a storage battery or welding machine; the ammeter used should be of the proper range, according to the source employed.

The characteristic resistance, R_k, could be very easily measured if we had two things at hand; an "end" of the pipe, that is, a break in its electrical continuity, and a zero resistance connection to "remote earth." The break we can find in a number of places—at an insulated joint, or at a temporary disconnected flange, or where the pipe has been cut during the installation of a junction. The zero resistance connection to remote earth cannot be had, or even closely approximated.

Instead of seeking this mathematical fiction, remote earth, we may measure the total resistance across an interruption in the pipe, as at an insulated joint; R_k will then be approximately half of the measured value. "Interference effect" due to the proximity of the two sections actually makes the measured value slightly high, so R_k should be taken as about 0.45 times the measured value. If a section of as long as, say, 100 ft. is out of the line, R_k may be taken as one-half.

When it is desired to measure R_k at a location where no break exists in the line, a more elaborate procedure must be employed, as diagramed in Fig. 2. A section of the line as long as convenient is connected to a source of current—preferably a welding machine—and a heavy current passed through it. The IR drop in this section affects the rest of the line, in both directions, exactly as would a generator inserted in a gap in the line; a generator whose voltage is equal to the IR drop.

As an example, suppose we have a 16-in., 0.312-in. wall pipe, 52 lb. per foot. A welding machine connected across a 200-ft. section delivers a current of 400 amp. E_k is measured as 0.43 volt, and a current of 0.32 amp. is measured (by IR drop) in the line. From these data we compute as follows:

R_s = 0.252/52 = 0.00484 ohms per kilofoot.
R_k = 0.43/2(0.32) = 0.67 ohms.
R_l = $(0.67)^2/0.00484$ = 92.7 kilofoot-ohms.
α = 0.00484/0.67 = 0.0072 per kilofoot.

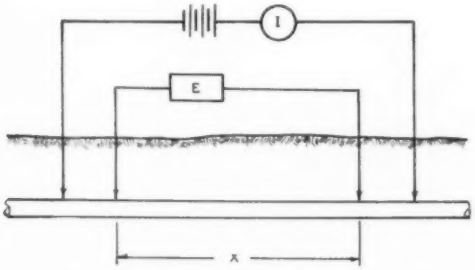


Fig. 1—Measurement of pipe resistance in place. Resistance of section X, $R_x = E/I$. Resistance per kilofoot, $R_k = 1{,}000\ R_x\ X$

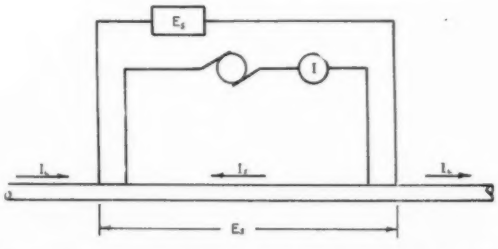
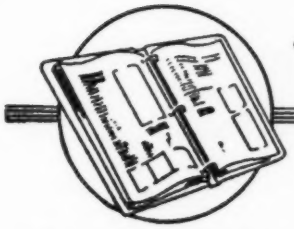


Fig. 2—Determination of characteristic resistance by using the IR drop in a section of line as a generator. $R_k = E_x/2I_x$.

Part 17 of a series by Marshall E. Parker, consulting engineer, Houston.



THE REFINER'S notebook

No. 77

Factors Affecting Throughput in Cat Cracking

by P. M. Reynolds*

DURING the last decade, three designs of catalytic cracking units were commercialized. These basic types are:

1. **Fixed bed.**—This unit is composed of three or more catalyst-containing vessels or "cases" manifolded together with piping such that one or more beds may be on cracking stream while the remainder are being regenerated. The oil, steam, and air are switched from catalyst case to catalyst case by automatic synchronized tubing devices. In the typical three-case unit, one case is alternately on stream, valving and purging, and then burning for given periods of time. These three operations are staggered so that one case is on stream all the time. The catalyst beds are fixed and the temperature of the bed is maintained at a comparatively constant temperature level by circulating a molten salt through finned heat-transfer tubes extending through the catalyst mass. The catalyst is usually in the form of pills or pellets about 1/6-in. in diameter and length.

2. **Thermofor.**—This design employs separate vessels for reaction and regeneration. The catalyst is moved continuously from the reactor to the regenerator and back by elevators. The regenerator-bed temperature is controlled by steam coils in the burning zone. The catalyst used in these units must have flow characteristics similar to granular percolation clays so as to be easily moved and transported during operation. These catalysts masses consist largely of material from 4 to 60 mesh size.

3. **Fluid.**—The fluid process has separate reactor and regenerator units through which the catalyst continuously circulates going alternately through reaction and regeneration. The catalyst is moved from the regenerator to reactor by means of vaporized oil feed and steam. Catalyst, acting like a fluid, is moved back to the regenerator by air and flue gases. The catalyst consists of a finely divided powder varying from 500μ to 10μ in size.

Development of other types of units is under way but the basic features of catalytic cracking are embodied in these three designs. Regardless of how the oil and catalyst are contacted or how the catalyst is transported, the cracking reaction is essentially the same. The basic differences in the theoretical design and operation of the various types of units lie in the heat balance of reaction and regeneration. From the refiner's standpoint, all designs perform the same operation; i.e., a high-octane gasoline is manufactured from various mixtures of gas oils. The general considerations that follow pertain directly only to the fluid-type unit but nearly the same relationships apply to all designs.

Fluid Catalysts

Each grain of fluid-catalyst powder is composed of a number of crystals. The catalyst is made from natural clays or synthesized chemically. The approximate composition of the natural grade is as follows:

Compound	Per cent
SiO_2	73.8
Al_2O_3	17.0
Fe_2O_3	2.3
TiO_2	0.4
CaO	2.2
MgO	4.3
	100.0

The synthetic catalyst most commonly used contains more silica and less alumina, iron, and calcium than natural. But the largest difference in natural and synthetic catalyst is in the type of crystals existing in the catalyst masses. In general, the synthetic catalyst, while it may be higher in price, produces higher octane, less coke, less debutanized gasoline of a higher vapor pressure and more olefins and isobutane. If the olefins and isobutane are converted into alkylate and polymer, the over-all debutanized gasoline obtained with synthetic catalyst would be about the same as that obtained with natural catalyst. In some cases, for the same depth of cracking, natural catalyst will handle as much feed as synthetic catalyst due to the fact that natural catalyst requires less excess oxygen during regeneration properly to burn coke from catalyst. This depends somewhat on catalyst poisoning by dirty feed stocks. Where the catalyst poisoning rate is not great, however, synthetic catalyst will not only produce less coke but will also allow the same coke burn off for a given air capacity.

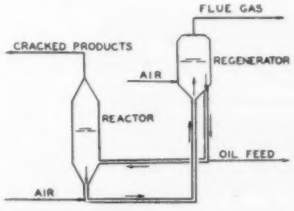


Fig. 1—Basic scheme of fluid catalytic cracking process.

Three functions of the catalyst are: (1) Reaction catalyzer, (2) heat-transfer medium from regenerator to reactor, and (3) medium for handling coke.

The cracking promotion quality or "activity" of a catalyst determines conversion level. Activity is high when the catalyst is new but after several hundred hours of operation it levels off to its own activity level according to feed stock, operating conditions, and type of catalyst. Economic operating levels of activity are much lower than originally predicted in the design of the earlier units.

Heat balance of fluid catalytic cracking units will be taken up in the next installment of The Refiner's Notebook, to be followed in later issues by discussion of the reaction and regeneration steps, feed stocks and the economics of product distribution.

*Process engineer, Mid-Continent Petroleum Corp. From paper presented at second annual process heating seminar, John Zink Burner Co., Tulsa.

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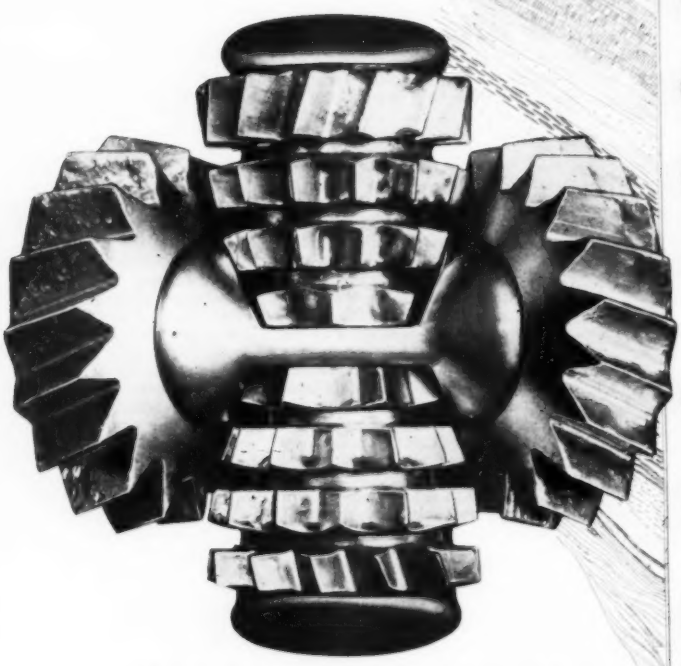

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ENGINEERING fundamentals

No. 449

Calculation of Magnitude of Water Drive Between Original and Saturation Pressures

PRODUCTION of petroleum from a reservoir where the crude oil is undersaturated often involves operation of combination of two mechanisms down to saturation pressure: fluid expansion and water drive.

Amount of water influx may be calculated by subtracting expansion of reservoir oil from voidage and adding amount of produced water at well head during pressure interval represented between original and saturation pressures.

Example: Consider an 8,500-ft. Yegua (Eocene) sandstone oil reservoir in Gulf Coast province. Original oil in place was calculated from core data to be 1,865,000 bbl. Original observed reservoir pressure was 3,650 psig. Saturation pressure, as determined from laboratory analysis of bottom-hole crude-oil sample, was 2,459 psig. During this pressure interval, 200,000 bbl. of stock-tank oil and 59,000 bbl. of salt water were produced from reservoir. Initial formation volume factor, from laboratory data, was 1.459 bbl. of reservoir oil per barrel of residual oil; formation volume factor at saturation pressure was determined as 1.492 bbl. per bbl.

Solution: The following formula may be used:

$$\begin{matrix}\text{net water influx} \\ W - w\end{matrix} = \begin{matrix}\text{voidage} \\ Q_o\beta_s\end{matrix} - \begin{matrix}\text{expansion} \\ Q_o(\beta_s - \beta_o)\end{matrix} \quad (1)$$

This equation relates the amount of water encroachment between initial and saturation pressures to the cumulative oil production, the volume factors of the reservoir crude, and the volume of produced water, for the interval represented between the two pressures.

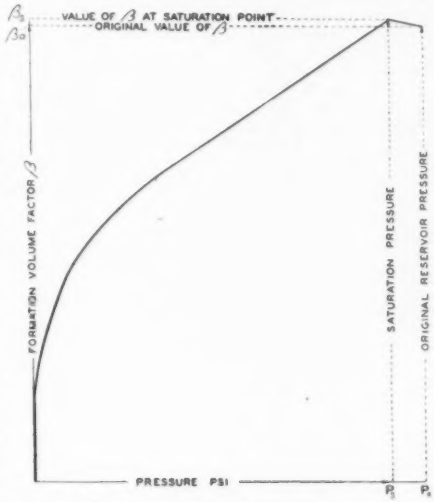

Fig. 1—Idealized curve showing formation volume factor as a function of pressure for case where original reservoir pressure exceeded saturation pressure.

Nomenclature

Q_o = reservoir oil in place: 1.865 million barrels.

Q_o = cumulative oil withdrawals to saturation pressure: 200,000 bbl.

β_o = initial formation volume factor: 1.459 bbl./bbl.

β_s = formation volume factor at saturation pressure: 1.492 bbl./bbl.

W = Total water influx into reservoir.

w = cumulative water produced between initial and saturation pressures: 59,000 bbl.

Rearrangement.—Equation 1 can be changed so that the quantity "w" appears in the right-hand side. Thus we may write:

$$W = Q_o\beta_s - Q_o(\beta_s - \beta_o) + w \quad (2)$$

substituting:

$$W = (200{,}000 \times 1.459) - 1{,}865{,}000\,(1.492 - 1.459) + 59{,}000 \quad (3)$$

simplifying:

$$W = 291{,}800 - 61{,}500 + 59{,}000 = 289{,}300 \text{ bbl.} \quad (4)$$

Per cent replacement.—Fraction of voidage replaced by encroaching water may be calculated by dividing net water influx by sum of voidage and produced water. Let R equal per cent replacement. We may write:

$$R = \frac{Q_o\beta_o - Q_o(\beta_s - \beta_o) + w}{Q_o\beta_o + w} \quad (5)$$

(From Equation 4, value of numerator is determined to be 289,300 bbl.)

substituting:

$$R = \frac{289{,}300}{291{,}800 + 59{,}000} = \frac{289{,}300}{350{,}800} = 82.5 \text{ per cent} \quad (6)$$

Application

One application of the per cent replacement calculation is related to determination of adequacy of natural water drive. If per cent replacement figure indicates water drive is inadequate (and rock permeabilities are sufficiently high) the need might be indicated for injection of extraneous water into reservoir for increasing recovery factor and obtaining higher maximum efficient producing rates during early life of field.

By Joseph A. Kornfeld, Mid-Continent District Editor, Tulsa

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Additives for Cetane-Number Improvement

Are diesel fuel additives for cetane-number improvement in general use today? If so, what are their chemical nature? Can cetane-number improvement alone overcome or greatly modify other difficulties attributable to the diesel fuel such as corrosiveness, gumming, solidification in cold weather, and insufficient lubrication of injector parts?—C. W. B.

Although formal information on the extent to which additives are used in diesel fuels for cetane-number improvement is not available, it is thought that such additives are not yet widely used. Nevertheless, the use of such additives has now been explored sufficiently completely to warrant serious consideration and it is expected that additives for cetane-number improvement will be widely used in a short time.

As one indication, the procurement agencies of the U. S. Navy have been exhaustively studying the use of such additives (Robbins, Audette and Reynolds III, "Performance and Stability of Some Diesel-Fuel Ignition-Quality Improvers," S.A.E. National Fuels and Lubricants meeting, Tulsa, November 9-10, 1950) and although additives are probably not now allowed in Navy diesel fuels, it is implied that some of the additives that were studied could be employed if conditions warranted their use.

The Robbins et al paper discloses the study of at least 72 additive compounds, mainly organic nitrates, peroxides, and nitroalkanes. The nitrates and peroxides show pronounced effectiveness. The average cetane boost for the 24 nitrates studied, was 13.8 (1.5 per cent by volume of additive), whereas the 9 peroxides used in the same concentration raised the cetane number by an average of 13 units. Although finely divided metallic sodium was the most effective agent that was studied, there were many difficulties in the use of sodium. Various amyl nitrates and a peroxidized petroleum distillate have been extensively studied since 1946 by the U. S. Naval Engineering Experimental Station. Among the nitroalkanes, 2,2-dinitro propane is promising.

Although these studies were promising, the effectiveness of the peroxides nitrates and nitrocarbamate differs in various fuels. More work is necessary before the exact behavior or usefulness of these and other additives can be stated.

With respect to the effect of cetane-number improvers on other operating characteristics than detonation quality, there are so many effects and so many possible additives that no definite statements can be made except with regard to particular additives. However, the following are the conclusions of the paper:

1. Continued study of the application of ignition quality improvers for diesel fuel oil is desirable because of:

(a) The potential influence of completely suitable additives of this type on Navy diesel-fuel procurement.

(b) The possibility of making available high-ignition-quality diesel fuel, irrespective of pour-point limitations.

(c) The advisability for fuel technology to keep ahead of equipment development in order that suitable fuels will be available for any future Naval engines that may require cetane numbers higher than 50.

2. A large number of compounds of various types have been found to be effective in raising the cetane number of diesel fuels, a concentration of 1.5 per cent of certain peroxides, alkyl nitrates, nitroalkanes and nitrocarbamates increasing the cetane number 20 or more units.

3. Many of the ignition-quality improvers lose their effectiveness when blended in diesel fuel and subjected to certain storage conditions.

4. Generally speaking, fuels containing ignition-quality improvers have higher carbon residue on 10 per cent residuum than the undoped fuels. In some cases the additives raise the neutralization number and/or lower the flash point. These effects have little practical significance unless the flash point is lowered to unsafe values.

5. On the basis of laboratory engine tests, certain additives:

(a) Did not materially increase the quantity of deposits on engine parts outside the piston ring belt.

(b) Had a tendency to cause piston ring sticking.

(c) Generally reduced exhaust smoke to a slight degree.

(d) Under certain conditions improved engine startability.

(e) Reduced power output slightly, except under certain conditions of supercharging where the reverse was true.

(f) Increased fuel consumption slightly or none at all.

(g) Generally decreased maximum cylinder pressure, rate of pressure rise and ignition lag.

(h) Showed no tendency to increase piston ring wear.

(i) In an isolated case, may have contributed to exhaust valve and injector valve sticking and corrosion of the diaphragm in a cylinder pressure pickup.

References

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4. Sloan, Scurlock and Herron, "The Low-Temperature Starting and Operation of Diesels," S.A.E. annual meeting, Detroit, Jan. 8-12, 1951.
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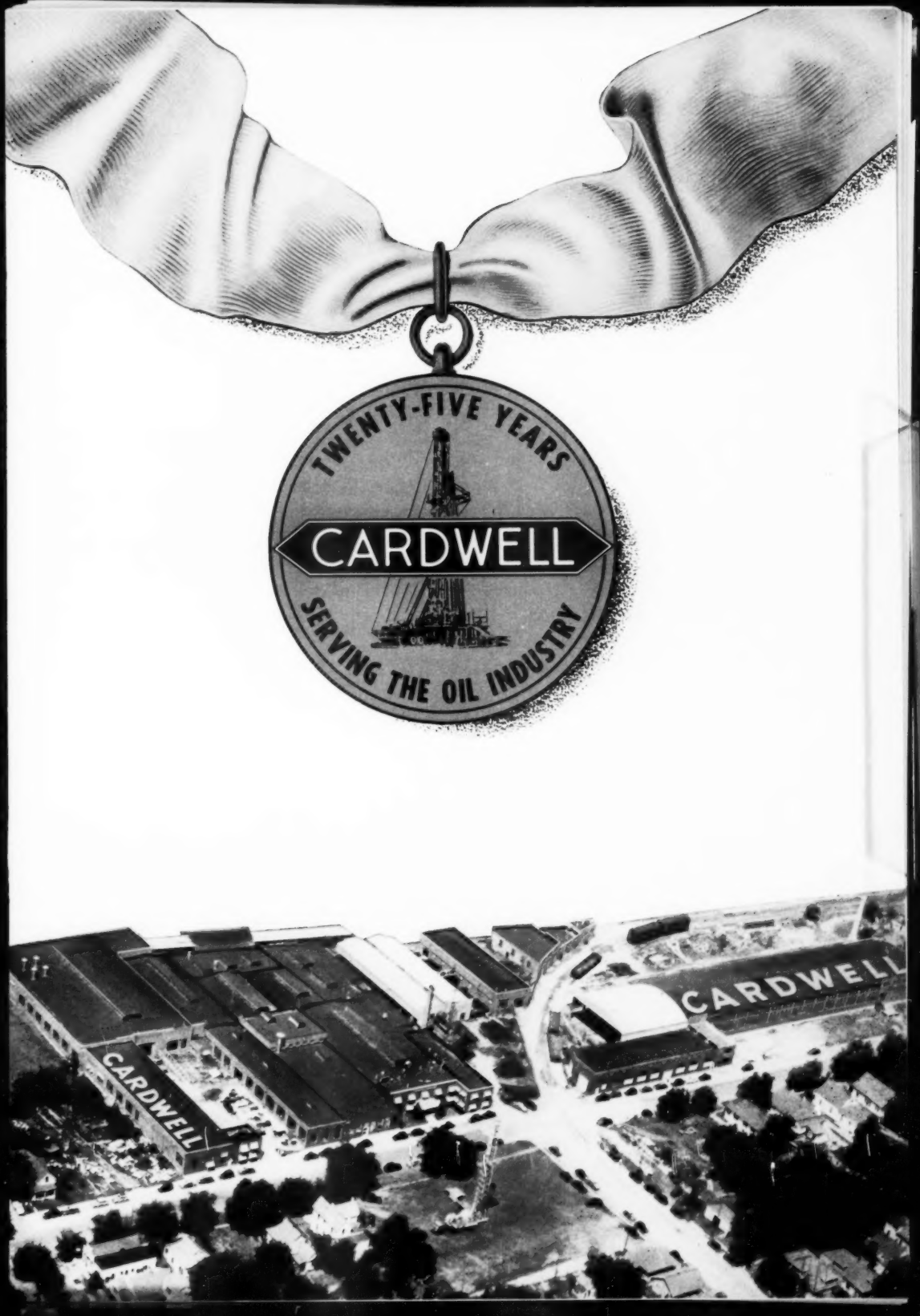
Aviation Gasoline for Automotive Service

If 90-octane aviation gasoline is used in autos, how will it affect the operating conditions of the engines? Will it make more miles per gallon, just the same, or less?—J. G. F.

The octane number of 90, considering just octane number, will have no adverse effects and in fact might give a slightly greater mileage. Ninety-octane premium motor fuel is on sale in many parts of the country. Such an octane number is necessary for some high-compression automotive engines.

Aviation gasoline has a different boiling range from that of motor gasoline. It contains less of the lowest-boiling materials and much less of the highest-boiling materials. Its low vapor pressure of 7 lb. R.v.p., as compared with 9.5 to 13.5 lb. for automotive gasolines, means that trouble with starting might be encountered at temperatures of about 50° F., and lower. Although the middle boiling range of an aviation fuel is generally low, it is almost totally lacking in the easily vaporizable parts that boil below 158° F. This would result in a somewhat slow warmup and sluggish acceleration at temperatures below about 40° F. The lack of high-boiling portions means that scarcely any of the gasoline would be lost into the crankcase.

On an average, the aviation gasoline would behave much like a regular motor fuel. At low temperatures and particularly for short operations about town, the aviation gasoline would probably give a slightly smaller mileage than regular gasoline.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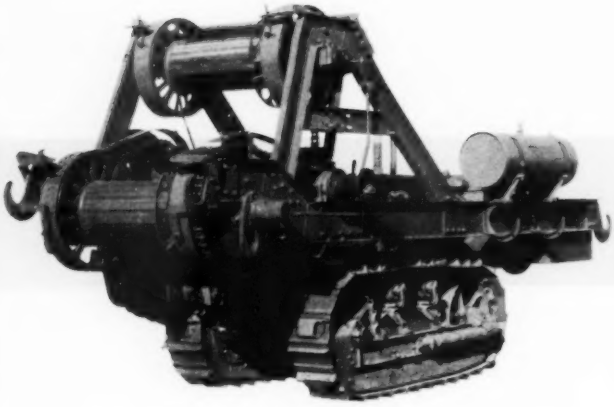

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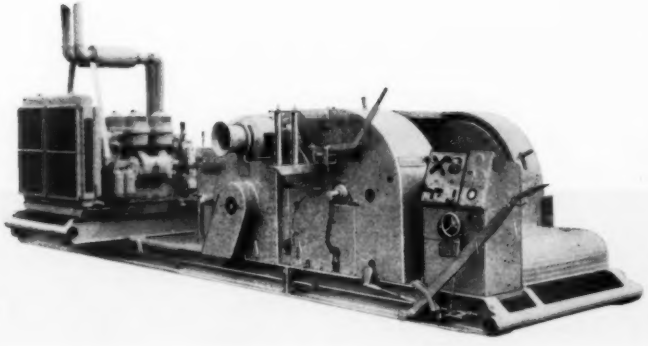
H. W. Cardwell



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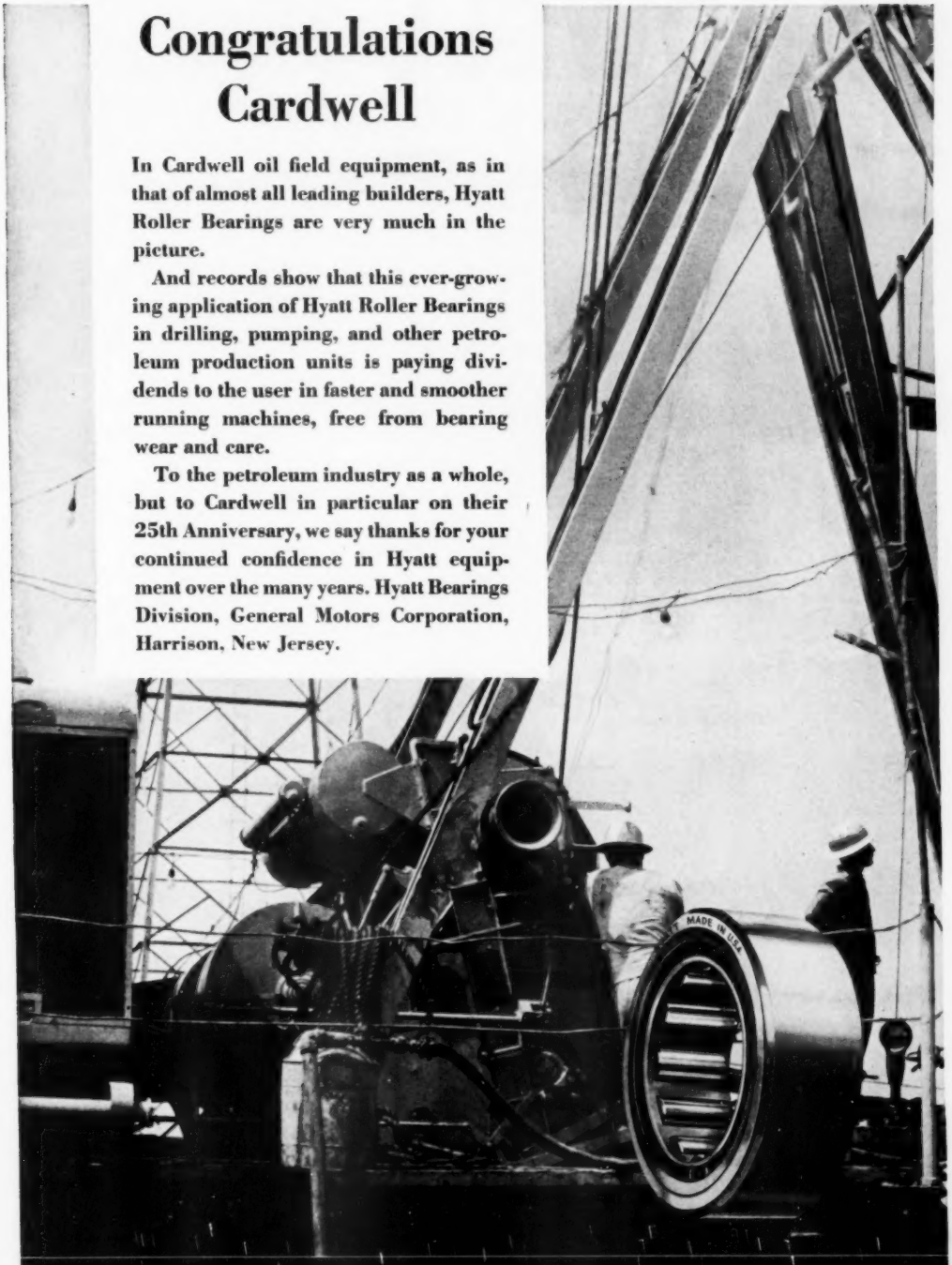

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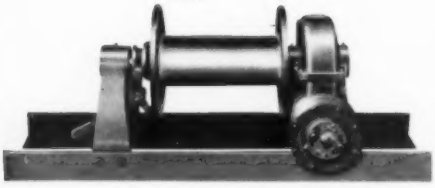

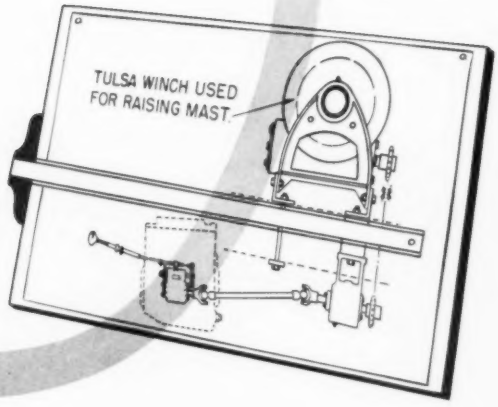

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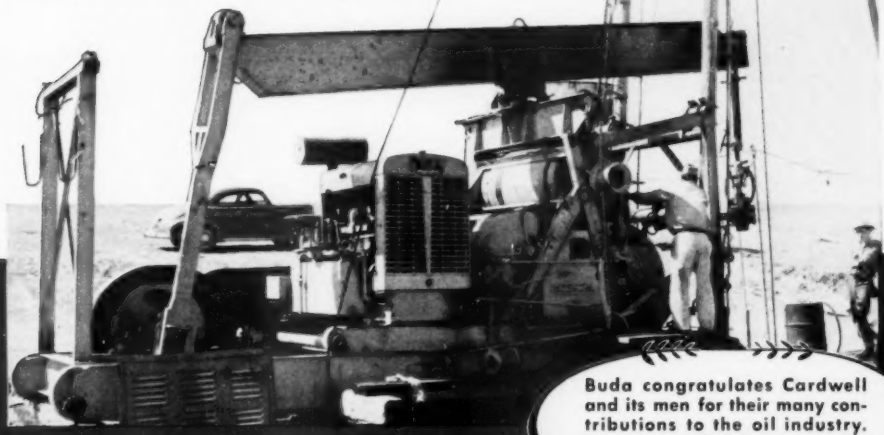
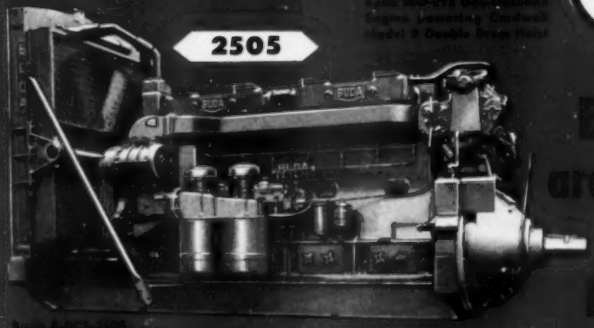


Buda congratulates Cardwell and its men for their many contributions to the oil industry. We are proud of our association with Cardwell.



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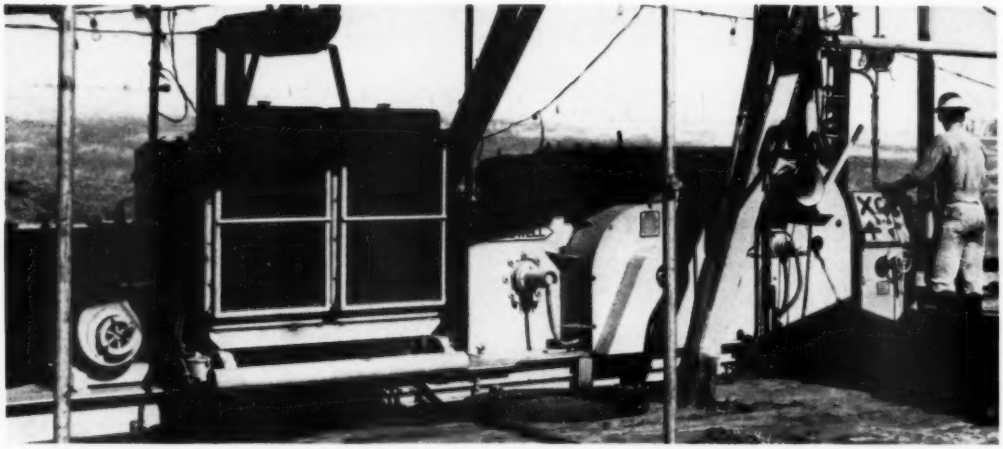
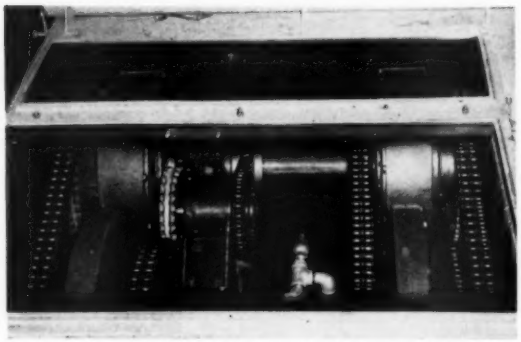


On the Job with the Latest Cardwell Model D Rig



The Diamond Roller Chain Transmission shown above is driven from the engines by means of triple strand Diamond Chain and the drums forward are driven from the transmission. From the engine shaft Diamond Chain also drives the mud pump.

• On the new Cardwell Model D Draw Works the *Diamond Roller Chain Transmission* is operated through air-controlled friction clutches running in oil to change to any transmission speed without stopping the block.

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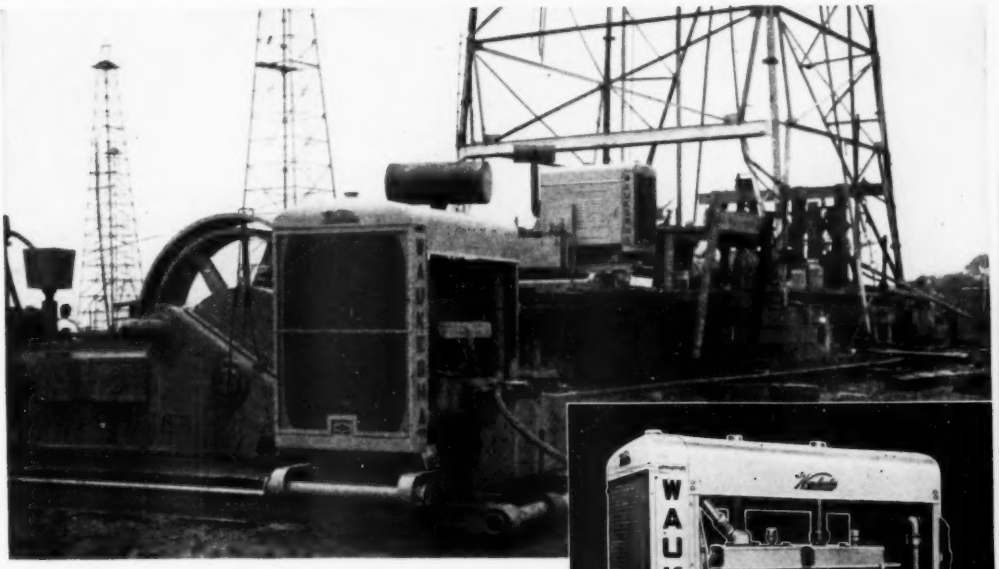

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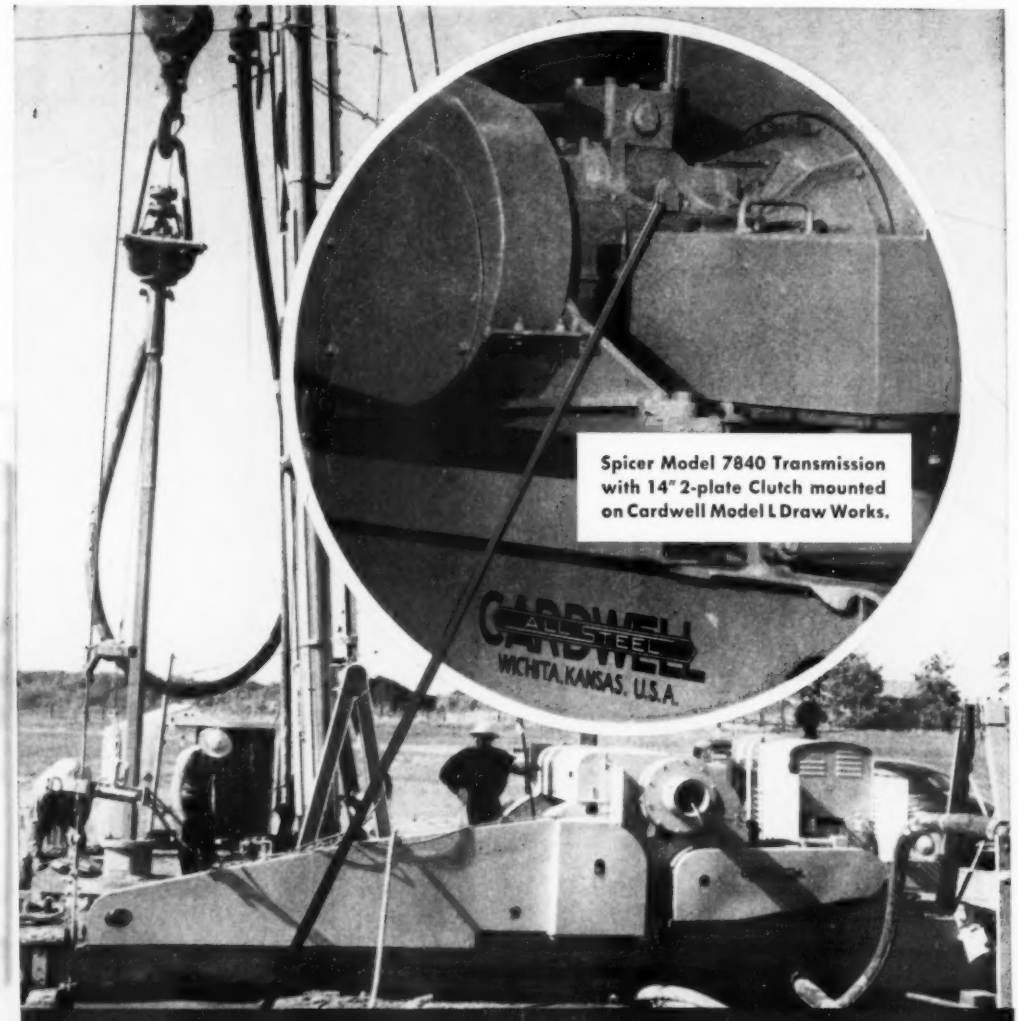
Diesel Power... POWER

132


Spicer Model 7840 Transmission with 14" 2-plate Clutch mounted on Cardwell Model L Draw Works.
CARDWELL
STEEL
WICHITA, KANSAS, U.S.A.

CARDWELL... *a credit to Spicer prestige*

For the rugged, uninterrupted, day and night performance demanded of oil well drilling and servicing rigs, Cardwell Manufacturing Company, Inc., has used Spicer Transmissions for many years.

Spicer Transmissions, Auxiliaries, Clutches, Power Take Offs, Universal Joints and Propeller Shafts, developed through 47 years of experience in the design and production of all types of power transmission equipment, are today widely used throughout the entire oil country field.

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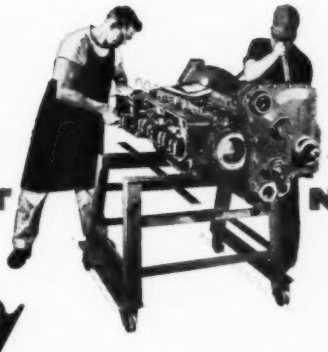

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Lightweight High-speed Diesel Engines (50-550 hp) for: on-highway trucks • off-highway trucks • buses • tractors • earthmovers • shovels • cranes • industrial locomotives • air compressors • logging yarders and loaders • drilling rigs • centrifugal pumps • generator sets and power units • work boats and pleasure craft

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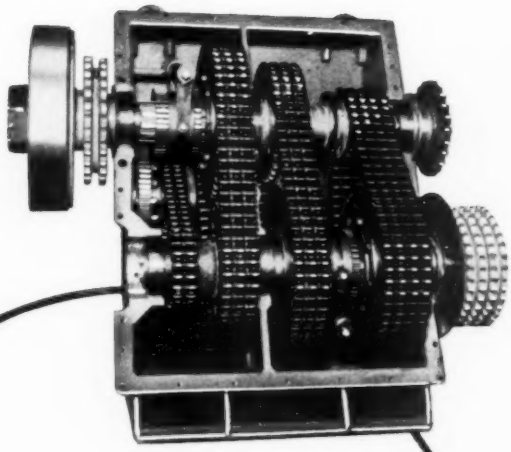
FOR 25 YEARS LEADERS IN THE FIELD



...AND CARDWELL SPECIFIES SKF

For the past quarter century, Cardwell Manufacturing Company has been building oil field equipment like this Model O Three-Engine Draw Works. And as with this SKF-equipped chain transmission, incorporated in their Model O, SKF has helped Cardwell put the right bearing in the right place.

SKF is always proud to co-operate with manufacturers like Cardwell, who have contributed so much to the petroleum industry in the design, development and production of oil field drilling equipment.

Here again, as in *all* industry, SKF Bearings are preferred.

7266

SKF
BALL AND ROLLER BEARINGS

REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

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DRILLERS! Send for this Ton-Mile Indicator

Union Engineers have developed this easy-to-use tool to help you measure the amount of work your rotary line has done. It helps you establish the proper time for cutting off. No complicated figuring with this Ton-Mile Indicator. It does all the work. With it you get a Union Log Book to help you keep well records. Mail the coupon for yours—*today!*

Wherever you go in the oil fields, you'll find that the drillers who get the most out of their rigs are the drillers who depend on TUFFY Rotary Lines.

TUFFY Rotary Lines are made with special steels and employ a unique construction that give them extra resistance to shock loads, crushing on drums and internal friction. That's why TUFFY Lines give you more round trips under all conditions.

TUFFY Standard Rotary Line

Designed for use on standard rigs and recommended for jackknife rigs when drilling deep.

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Spools and reeves easier at high speeds over the smaller drums of the jackknife rig.

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EASY TO ORDER

Just specify the type of TUFFY Rotary Line you need—Standard or Jackknife—the length of line and the size. That's all. No complicated ordering symbols. It's easy.

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Gentlemen: Please Have Your Fieldman Deliver My Union Ton-Mile Indicator and New Log Book and Show Me How Easy It Is To Use.

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his footwork solves your guesswork!

Footwork is second nature with a Gardner-Denver field engineer. He often tramps around the oil fields, learning first hand just what your most troublesome drilling problems are — just what you expect a slush pump to do.

That's one reason Gardner-Denver Slush Pumps meet your needs so well. You don't have to guess about their performance on your rig.

Check these field-proved FX features:

- Divided liquid cylinders of GarDurloy—the extra tough alloy specially developed for mud pump service.
- "Slush-proof" liquid end parts—easily changed in the field without opening the crankcase to dust and dirt.
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- Positive, mud-stop protection prevents contamination of crankcase oil.
- Plus: eccentric construction—herring-bone gears—flood lubrication—and many other quality features.

Ask your Gardner-Denver field engineer for expert advice on mud pump selection. Or write us for further information.

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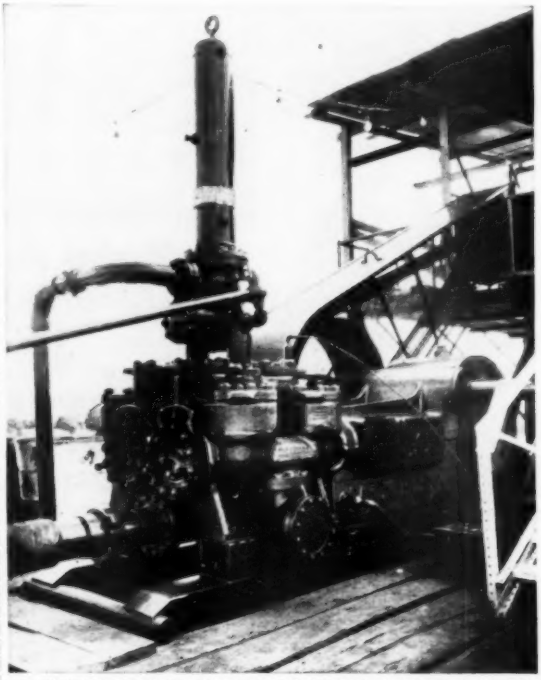
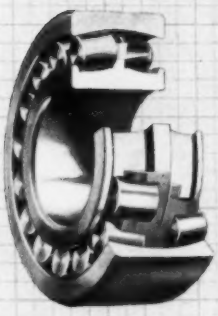
THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS



Congratulations to another drilling equipment pioneer —

CARDWELL MANUFACTURING COMPANY
— on their 25th anniversary

rigged for action...



TORRINGTON SPHERICAL ROLLER BEARINGS

The Cardwell Trailerig is built light and rugged for fast moves, quick rig-up, and heavy-duty service. Torrington Spherical Roller Bearings on the main drum shaft and gear shafts help keep it "rigged for action."

These self-aligning bearings compensate for shaft deflection and prevent development of binding stresses. They eliminate interruptions for alignment adjustments. Longer service life with lower maintenance is assured.

To keep your equipment *always* in working trim, specify Torrington Spherical Roller Bearings to handle heavy loads and shaft deflection. Call on our engineers for assistance in solving your specific bearing problems.

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TORRINGTON *SPHERICAL ROLLER* **BEARINGS**

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STRAIGHT ROLLER • NEEDLE
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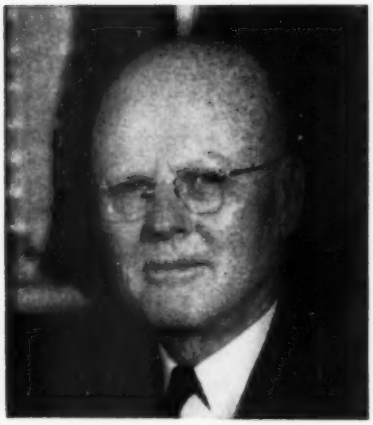
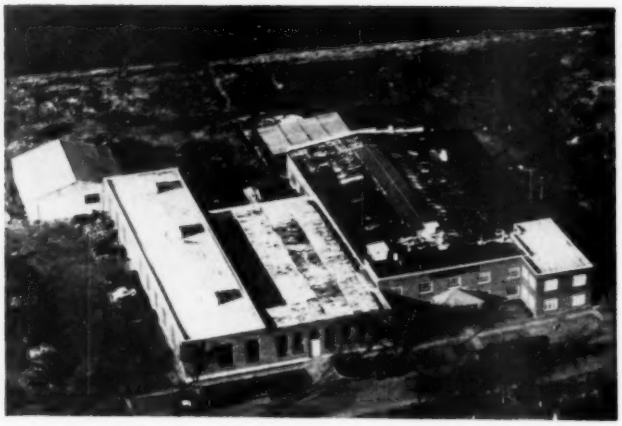


H. W. Cardwell, president and founder, Cardwell Manufacturing Co., Inc., Wichita, Kans.



IN 1926.—The Cardwell organization originated from these beginnings 25 years ago; this aerial photograph shows the first buildings at 801 South Wichita, Wichita, Kans.

CARDWELL REACHES SILVER ANNIVERSARY

Pioneer oil-field manufacturing firm was founded during 1926 to construct tractor-mounted portable oil-well servicing hoists; today, it builds 14 models of drilling and servicing rigs in use wherever oil and natural gas are drilled for and produced.

by Joseph A. Kornfeld
Mid-Continent District Editor

THE Cardwell Manufacturing Co., Inc., Wichita, Kans., pioneer builder of oil-field equipment, observed its twenty-fifth anniversary on June 22, 1951.

The firm, one of the nation's oldest manufacturers of servicing and drilling equipment, was founded in 1926 for the purpose of manufacturing portable hoists which could be mounted on and powered by track-type tractors.

At the request of Roxana Petroleum Co., now Shell Oil Co., these portable oil-well servicing hoists were built on Caterpillar tractors by H. W. Cardwell Co., then Caterpillar dealers in the Kansas-Oklahoma territory.

Servicing Hoists

Need for placing servicing hoists on tractors existed due to road conditions in oil fields. The use of track-type tractors made it possible easily to transport equipment for servicing requirements. Various types of servicing hoists were developed to fit varying field practice, both in single and double-drum models powered by the tractor engine. Miscellaneous attachments were added to the rigs to provide greater use of well-workover equipment, such as rotary drives, rotary workovers, and cable-tool spudders.

Two years later, All-Steel Products Manufacturing Co., a Kansas corporation, was organized to take over the oil-well servicing and manufacturing business of H. W. Cardwell Co.

In 1929, the first building unit of the present plant was constructed at 801 South Wichita Street, Wichita, and the machine-tool equipment previously housed with H. W. Cardwell Co. was moved to that location. Through the years as road conditions gradually improved, transition designs were developed whereby the equipment, as ordinarily mounted on the tractors, could be placed upon skids for truck mounting. The equipment was powered by a separate engine. These truck-mounted rigs supplanted the basic designs which were tractor mounted and powered.

Additional equipment was developed and manufactured for mounting on track-laying tractors, such as side-boom and backfiller equipment used in laying pipe lines. A complete series of pipe tongs and pipe dollies for handling the pipe was developed and placed on the market. In 1934, the organizational name, All-Steel Products Manufacturing Co., was changed to Cardwell Manufacturing Co., Inc.

Cardwell introduced the first air-controlled draw works in the world at the International Petroleum Exposition in Tulsa in 1940. This rig is now sold as the Model O draw works in sizes capable of drilling from 4,000 to 10,000 ft. The company has spent many hundred of thousands of dollars in experimental and development work to improve its rig and rig parts. The firm has pioneered in the use of alloy steels and heat treatment to all wearing parts.

Flex*Disc Clutch

The firm fabricates all of its rigs within its own Wichita plant, including the rig transmissions. In an effort to eliminate a source of trouble to the driller it has designed its own clutches. During the past 20 years, the firm has continually kept engineers in research activities in order to find a clutch that would stand hard usage of servicing and drilling rigs without failure.

The Model 38 "Flex*Disc" clutch is the result of these years of research, a clutch which the company claims has proved itself free of maintenance, adjustment, or need of replacement parts for periods up to 5 years or more of constant use.

Trailerig

Cardwell always holds to its own original designs. It has incorporated a number of novel features in its

IN 1951.—Today, Cardwell operations sprawl over the many structures shown in this airplane view; contrast the expansion with the view on the opposite page.

units. An example of advanced design is the "Trailerig," a complete drilling rig and mast which is exceedingly easy to handle. It is air controlled throughout, folds into a single, movable semitrailer with mounted draw works and mast with portable substructure. The design permits use without ramps.

This rig can be moved completely with the traveling block and lines reeved up and in place. It can be assembled and ready for work at a new location in the matter of from 2 to 3 hours after it reaches the well site. Capacity of this rig is 5,000 ft. for drilling or 10,000 ft. for workover.

Rotary Attachments

As demand diminished for tractor-mounted equipment and requirements increased for equipment of greater portability, complete new designs were developed of skid-mounted servicing hoists intended for truck transportation—either permanently mounted or of a removable type. This equipment was developed complete with various attachments, such as masts, rotary drives, and spudders for cable-tool operation. Servicing of wells by rotary attachments on these hoists gradually expanded into their use for complete drilling of wells by the rotary method.

Augmenting the hoists, Cardwell Manufacturing Co. then developed a full line of draw works in single and double drum, with single, twin, and triple engines, until today there are available five models of draw works with Cardwell friction clutches throughout, and telescoping masts of various types and sizes for drilling in and servicing the deepest wells.

Commensurate with this growth, the Cardwell organization today employs up to 550 people in its Wichita plant. In addition, it maintains a complete direct sales organization: a world-wide export division is directed from its New York office. Dealer representation is maintained in British West Indies, Java, Holland, Argentina, and other points.

Service parts stocks are factory owned and maintained, conveniently located to oil-producing areas throughout the world.

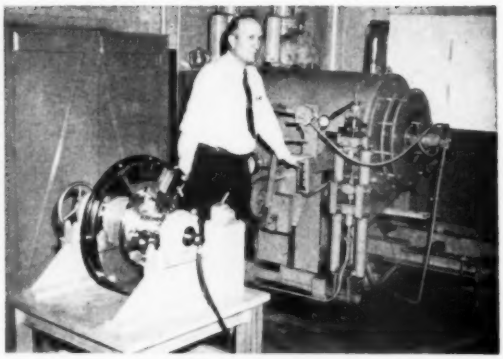
Stock stores handling parts are located in many points in the United States and Canada. Stock dealers are located in Puerto La Cruz and Maracaibo, Venezuela, and Port-of-Spain, Trinidad, B. W. I.

The Cardwell line of servicing and drilling rigs comprises 14 different models with a size to fit every well depth. Standard attachments are available to conform to all types of field practice. Many of the rigs have interchangeable parts; this feature is of major importance to users in foreign lands where servicing and inventory form a real problem. All rigs have available telescoping masts which have proven popular in oil-well drilling and servicing.

The entire organization has been keyed up to current developments in drilling and servicing requirements throughout the oil fields of the world to the end that engineering and development anticipate tomorrow's field requirements. In the manufacturing division, all shop men are cognizant of the Cardwell slogan: "You cannot inspect quality into a part!"

Metallurgical section plays a key role in maintaining quality control. A. F. Schroeder, chief metallurgist, is shown at work in the metallurgical laboratory.

George W. Marsh, in charge of final inspection for Cardwell, shows how a socket wrench is all that is needed to put together the 38 clutch used in Models D, L, O, S, and Mobilhoist rigs; side view of clutch appears in back of table.



The experimental, clutch-testing machine, shown at right with Harold H. Slattery, foreman in charge of sub and final assembly, has made 300,000 engagements on the Model 38 clutch during the past 1½ years, equivalent to 20 years of normal field service.

WORLD-WIDE PERFORMANCE

by Robert M. Smith*

Out of Cardwell files come records of low maintenance costs; in 25 months, one Edmonton, Alta., contractor reported an upkeep cost of approximately 1 per cent per year of initial investment.

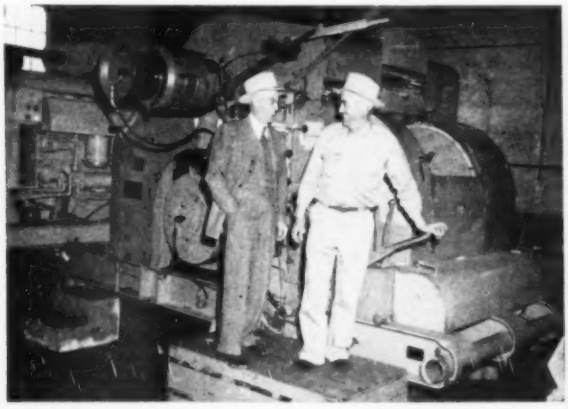
FROM company files come records of continuously low maintenance costs which prove that Cardwell equipment is "tough iron."

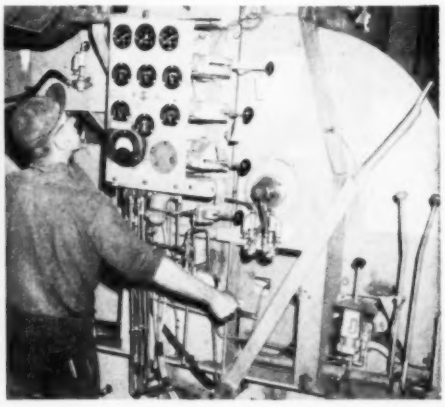
Eastern Colorado.—Savings of from one to several days per well in moving, rigging-up and tearing-down-time are reported for the Trailermast delivered recently to Ohio Oil Co. for use in the Julesburg basin of northeastern Colorado and southwestern Nebraska. This 96-ft. telescoping tubular mast and semi-trailer combination with a working hook-load capacity of 150,000 lb. has been found to be particularly well suited to drilling conditions in the Sidney area. Ohio has kept this rig busy on a continuous exploratory drilling program to depths approximating 4,800 ft.

Western Canada.—A maintenance cost of only 1.35 per cent per year of total initial cost of a Trailerig is reported by McIntyre & Webster, Edmonton, Alta., drilling contractors. For 25 months of continuous drilling, maintenance cost was only $1,892.07 or 2.7 per cent of the initial investment. Moreover, costs of moving the unit from one location to another have been as low as $70.

Central Kansas.—The first purchaser of a Model "D" rig was B. & R. Drilling Co., of Russell, Kans. This progressive firm, one of the leading contractors on the Central Kansas Uplift, has been a Cardwell rig user for more than two decades. During 1950, this firm cut 685,000 ft. of hole

*Domestic sales manager, Cardwell Manufacturing Co., Wichita, Kans.





Left: Shown here taking delivery on a new Model "O" 8,000-ft. drilling rig for operations in Saskatchewan are J. E. Taylor, left, owner, and B. E. Hine, toolpusher, Taylor Drilling Co., Lewistown, Mont. Right: Mike McCrumb, engineer, is shown testing air-controlled panel for Model "O" rig.

Special telescopic mast equipped with Model S draw works was recently delivered to Ohio Oil Co., Casper, Wyo., for drilling in Julesburg basin. Below is view of testing gage, showing needle registering test load of 150,000 psi.

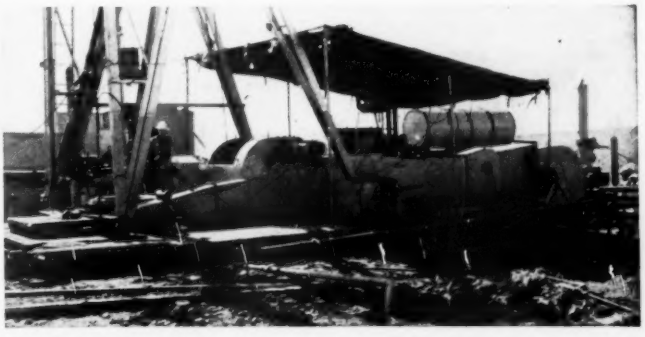
in Kansas; 235 wells being drilled to an average depth of 3,000 ft. Currently, B. & R. operates in the eastern, central, and western Kansas areas with eight rotary rigs. Of these, the Model "D" is the latest acquisition; because of its portability and reduced road dimensions, it has been utilized on the long-haul drilling commitments.

Velma.—Outstanding performance for the Model "S" single-engine draw works is demonstrated in Velma field of western Oklahoma. R. V. Dillard, Duncan, Okla., contractor, drilled 38 wells with the rig from March 1, 1949, to February 1, 1951. The only repair necessary during this period was a small bearing.

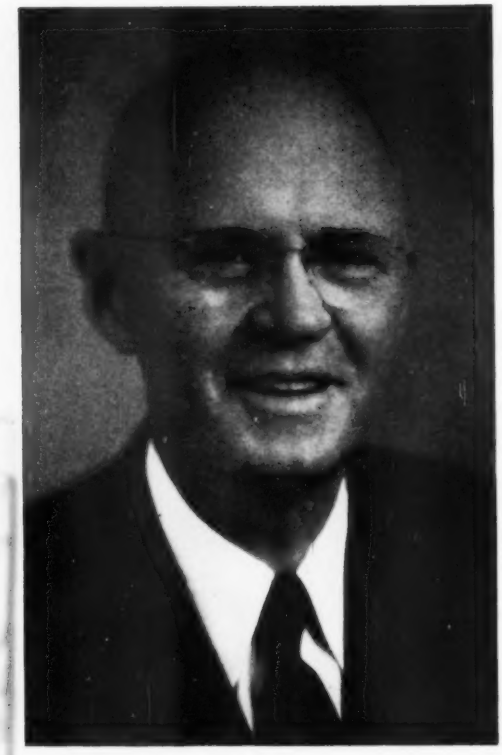
South Texas.—Another example of low maintenance cost of Cardwell equipment is that reported by Armstrong & Cotton, Corpus Christi operators. During the past 18 months, this firm has been operating continuously a Model "L" rig with an expenditure of only .4 per cent of the original investment for repair parts.

San Antonio.—During 1950, Rowan & Hope, prominent drilling contractors, purchased a Model "O" three-engine draw works. To date total expenditures for maintenance parts amount to only .7 per cent of the initial investment. The first four wells drilled with this rig averaged 7,800 ft. in depth.

Charles H. Mouser, left, service manager, hands a parts book to B. L. Mouser who has been a Cardwell rig owner and user for the past 25 years.



B. & R. Drilling Co., Russell, Kans., was the first purchaser of a Model "D" rig and one of these models is shown in operation in the Central Kansas oil fields; at left is Chet Roberts, president of the firm.



Thanks...

to a GREAT INDUSTRY

• As we enter our 25th year of business we are grateful for the worldwide patronage given our products, and take this means of thanking the many thousands of men responsible for our success. In return, we pledge a continuance of the never-ending improvements that have kept our products second to none in their field.

W. W. Foster

Foster Cathead Company celebrates its 25th anniversary this year. W. W. Foster personally celebrates his 50th anniversary in oil this year . . . 25 years of practical drilling experience, followed by 25 years of building a product his experience found a need for in the interest of greater *safety* and greater *efficiency* in drilling.

• Congratulations to Cardwell Manufacturing Company who are also celebrating their 25th Anniversary as a Manufacturer of Oil Field Equipment.

Above Photo shows a Foster Cathead in operation on a Cardwell Drawworks in Italy.

Foster CATHEAD COMPANY

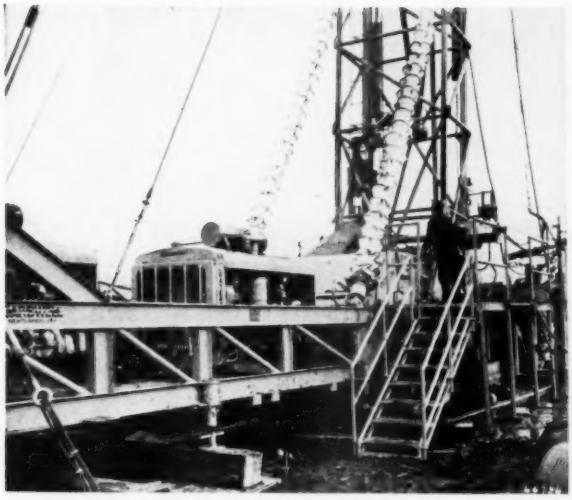
P. O. BOX 1673 WICHITA FALLS, TEXAS

FACTORY REPRESENTATIVES

O. W. Frogge, Casper, Wyoming

Tillery & Parks, Odessa, Texas

R. D. Cloninger, Lafayette, Louisiana



McIntyre & Webster, Edmonton, Alta., were the purchasers of the first Trailerig to operate in Canada. Two views of the rig are shown above. It has dug more than 120,000 ft. of hole in the past 25 months.

OPERATIONS IN CANADA

Nearly one-third of all of the drilling rigs now in operation in Canada are of Cardwell manufacture; one Model H unit, purchased 10 years ago, has dug one-half million feet of hole, mostly in Alberta.

by Len Walker

FROM Dawson Creek and Bluesky in Peace River block, all the way to Del Bonita in southern Alberta are to be found Cardwell drilling and servicing rigs. These pinpoint the Canadian drilling scene extending to Watrous in Saskatchewan and as far east as Sarnia in Ontario.

Nearly one-third of all rigs operating in Canada are of Cardwell manufacture; or 70 units out of a total of 240 rigs currently in operation. Forty of the Cardwell units in Canada are rotary rigs, the remainder being in well-servicing and work-over work.

Half-million feet.—A rig purchased 10 years ago by Harry Bass of Dallas has made more than one-half million feet of hole, principally in Canadian operations, and is still digging. Bass, partner of the firm of Can-Tex Drilling Co., Ltd., states that this is their biggest money maker. The unit was a Model H (Serial HL-91) purchased in 1940 in Illinois and shipped to Canada in 1942. Latest of the five rigs the firm is running in Canada is Model OA which was delivered during April, 1951; it is digging in Duhamel field.

First Trailerig.—The first Trailerig to operate in Canada was purchased by McIntyre & Webster, Ltd., Edmonton, Alta., during April 1949. It has drilled 34 holes, ranging in depth from 3,200 to 5,700 ft., totaling more than 120,000 ft. Average moving costs on this rig are less than $250 per location. At this time, this rig is digging 4,000-ft. holes in Excelsior field in only 12 to 14 days, on and off.

Well servicing.—Among the leading well-servicing contractors in Canadian operations are Prairie Well Servicing Co., Ltd., which operates two Model H pulling units, a Mobilhoist, and a Model K spudder. Red Well Servicing Co., Ltd., owns three Model H units and one plain Model Q mounted on a 96-ft. Trailermast.

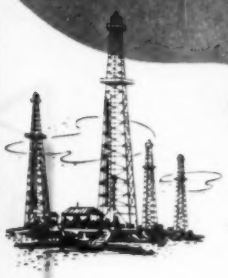
Service and parts.—Rig Service & Parts Service, Ltd., Edmonton, Alta., maintains a complete parts stock to service Cardwell rigs. Howard Heard, manager, operates two field service trucks around the clock.

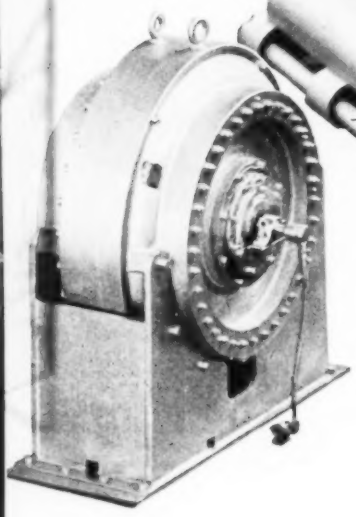
After 12 years.—More than 1,500,000 ft. of hole has been cut by a Model R rig during the past 12 years; it is still making hole in western Canada oil fields and recently completed a 4,874-ft. test. Since it first started making hole in 1938, more than 600 of the Model R rigs have come off of the company assembly lines in Wichita plant.

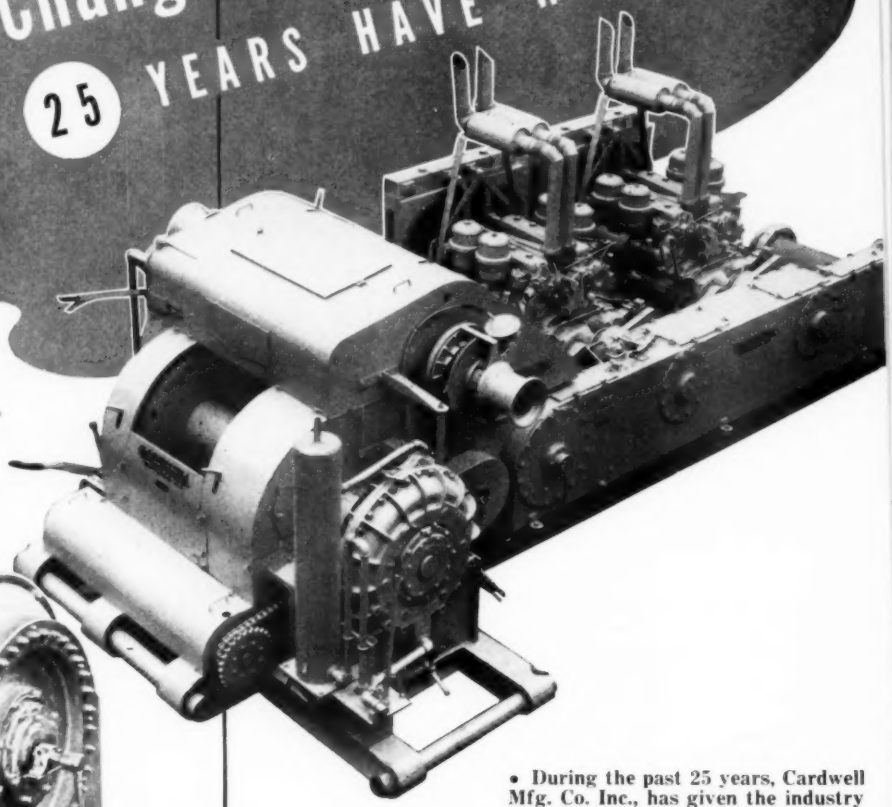
THE AUTHOR

Len Walker is Cardwell representative for Canada, with headquarters in Calgary, Alta. His 15 years of experience in the oil fields of both Americas started in 1936 when he was a roughneck and rotary driller in Turner Valley. About 4 years later, he joined the firm of Neal & Massy Engineering Co. at Port-of-Spain, Trinidad, B.W.I., working there until 1943. In that year, he became Canadian district engineer for Oil Well Supply Co., serving this firm for the ensuing 2 years. From 1945 to 1949, he was sales engineer and manager for Caterpillar Tractor Co., distributors in Alberta and Trinidad. He joined the Cardwell organization in January 1949.

What Changes... THESE 25 YEARS HAVE WROUGHT







• Parkersburg's newest Hydromatic, the "Super 46" is the most powerful ever built. It develops 7000 H.P. at 400 R.P.M. and 4700 H.P. at 350 R.P.M. On a drawworks with a 30" drum and 8 lines, the "Super 46" will hold a 200,000 lb. load to a speed of 90' in 19 seconds. It has all the power needed to meet the braking requirements of 20,000 foot drilling.

No. 5112

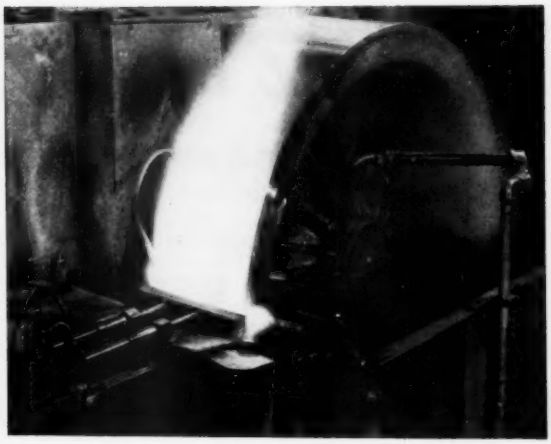
• During the past 25 years, Cardwell Mfg. Co. Inc., has given the industry many "firsts" in drawworks design, construction and performance. Our congratulations on your 25th anniversary and your many developments which have contributed to the progress of rotary drilling.

Soon after Cardwell's establishment, when the lack of adequate drawworks brakes threatened to halt all attempts to drill below 8000 feet, Parkersburg gave the industry the Hydromatic brake . . . first improvement in braking equipment since the beginning of drilling. Its introduction made possible the drilling of deeper wells . . . the discovery of deeper pools . . . and paved the way for drawworks manufacturers to meet the industry's demand for deep well drawworks with adequate braking equipment.

Today, as they have since the early days of the Parkersburg Hydromatic, Cardwell is a staunch supporter of this brake that means greater safety on the rig . . . longer life for mechanical brakes and linings . . . less brake repairs and replacements . . . greater speed on round trips . . . less strain and shock loads on the drawworks.

PARKERSBURG

RIG & REEL COMPANY • Parkersburg, West Virginia



Metallurgical heat treating of machined parts comprises an integral part of manufacturing oil-field equipment. Nestor Jaramillo, left, is hardening a part on water-quench electric induction unit; brake-flange hardening operation is shown at right.

RESEARCH AND DEVELOPMENT

by Gerald G. Brown*

Besides cable-tool rigs for completion and workover operations, Cardwell has focused extensive research on clutch development, brake flanges, machined sprockets, and rotary roller chain.

CARDWELL MANUFACTURING CO. was organized with the definite objective of building equipment for the oil industry by utilizing modern and progressive engineering practice and manufacturing processes.

Machined sprockets.—From the beginning the company adopted the use of alloy steels and heat-treated parts. Equipment was designed with steel sprockets having machine-cut teeth together with high-strength lightweight roller chain. The objective was to maintain quality and at the same time attain light weight for it was realized that transportation expense in the oil fields was a major item.

By manufacturing servicing hoists which were light in weight, of quality design and materials, it was possible to offer the industry units which would eliminate the enormous investment in equipment that was then in standard use.

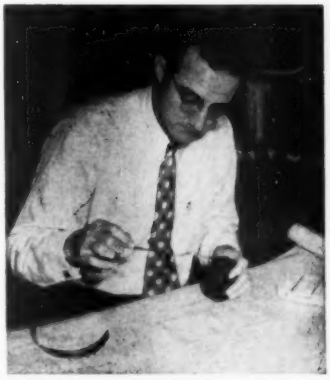
Tractor-mounted hoists.—Our first unit was a tractor-mounted (Caterpillar) oil-field servicing hoist—the first to be built of this type. This unit was followed by a complete series of tractor-mounted servicing hoists. This equipment was then supplemented by a comparable line of skid units suitable for mounting on tractors or for use directly on the derrick floor.

Practice in the different fields of the world soon made it necessary to manufacture a varied line of attachments so that the equipment could be adapted to cable tool or rotary workover well service. These attachments consisted of spudders and beams for cable-tool use and an attachment for driving the rotary table.

*Vice president, research, Cardwell Manufacturing Co., Inc., Wichita, Kans.

Cable-Tool Completion

Rotary-drilled wells were quite often dry holes due to the congealing action of the drilling mud in the oil strata. Realizing this condition, Cardwell early promoted the practice of finishing rotary-drilled wells with cable tools. By the cable-tool method, and the absence of mud pressure, many wells were drilled in as producers whereas otherwise they might have been dry holes. This system has now become standard practice and adopted by production engineers the world over in low-gas pressure areas.



Permanent blue-print records of every manufactured part are preserved on microfilm: L. Montre, chief production engineer, examines an old roll.

The firm has been one of the pioneers in the design and manufacture of cable-tool rigs for completion and workover operations. During the past 20 years, cable tools have found wide applications for completion operations in low-pressure reservoirs.

Ruggedness and surplus engine horsepower are two major factors considered by Cardwell engineers in the design of hoists for cable-tool hoists. One explanation for the use of additional horsepower is that completion and workover work is conducted at the full depth of the wells. The availability of additional horsepower for hoisting materially lowers the round-trip time. The high rate of penetration from a modern and well-designed spudder or walking beam

A great combination

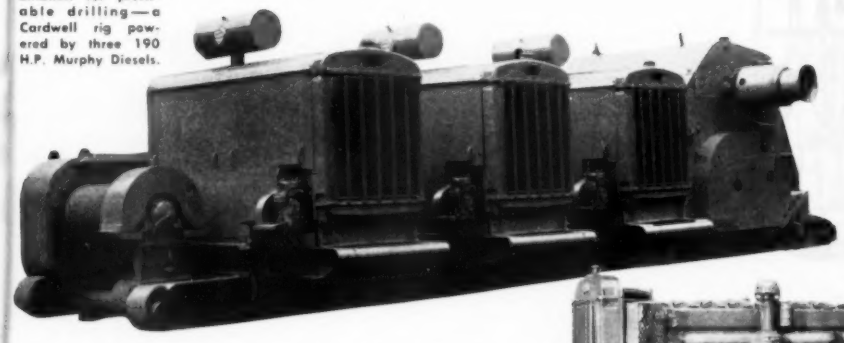
for more profitable drilling

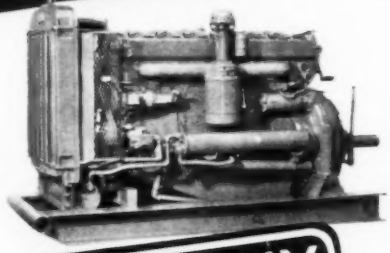
. . . a good rig

and

MURPHY DIESEL POWER

A typical good combination for profitable drilling—a Cardwell rig powered by three 190 H.P. Murphy Diesels.





A good rig or good power alone isn't enough for good drilling but when you hook Murphy Diesels onto a good rig, you have the right combination for really making hole. That's because Murphy Diesel Power is heavy duty power that is immediately responsive. It's economical power, too, enabling you to make more hole per gallon of fuel.

Full details are given in the booklet, *"10 Questions to Ask a Diesel Engine Salesman"*. Ask your Murphy Diesel Dealer for a copy or write direct.

MURPHY DIESEL COMPANY

5305 W. Burnham St., Milwaukee 14, Wisconsin
OIL INDUSTRY FACTORY BRANCH—Sales, Parts and Service:
113-117 South Elwood Street, Tulsa, Oklahoma

MURPHY DIESEL

Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 226 H.P., 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W. Dual-Fuel Engines, 135 to 180 H.P. Also Crude Oil Burning Engines.

See Your Murphy Diesel Dealer

LOS ANGELES, CALIFORNIA
Engine Sales & Service

SAN ANTONIO, TEXAS
J. E. Ingram Equipment Co.

EVANSVILLE, INDIANA
Pershing Equipment Co.

EDMONTON, ALBERTA, CANADA
Northern Engine & Equip. Co., Ltd.

AMARILLO, TEXAS
Service & Supply

DALLAS, TEXAS
Conley-Lott-Nichols Mach. Co.

HOUSTON, TEXAS
Houston Engine & Pump Co., Inc.

ODESSA, TEXAS
Electric Service & Supply Co.

is sufficiently great to employ it economically for deepening operations.

Rig flexibility.—Purchasers of Cardwell rigs found that by the use of the cable-tool and rotary-table drive attachments oil wells could be drilled at considerably less cost, due to the quality construction and light weight, than through use of the heavy equipment which had been previously available. We were thereby forced into the manufacture of drilling rigs by the customers who had been using the equipment with the cable-tool and rotary-drive attachments for drilling and had found it highly satisfactory. This demand eventually resulted in the design and production of a complete line of drilling rigs for shallow as well as deep rotary drilling.

Brake Flanges

Cardwell servicing and drilling rigs have always featured original design and have never followed standard old-time practices where newer and better methods could be devised. We early found that one of the largest expenses on a drilling rig come from brake-flange replacements.

The firm has expended over $200,000 in research and experimental testing in order to develop brake flanges of a longer life. Cardwell brake flanges of today are 500 Brinell in hardness, with a depth of hardness ¼ in. from the surface of the brake flange. All flanges are ground after heat treatment, thereby giving a smooth surface for better braking capacity and longer life for the brake blocks.

Roller chain.—Cardwell has promoted the use of high-strength light-weight roller chain for rotary-table drives, which has now become standard practice on modern drilling equipment. We have adopted as a standard practice heat treatment of pins and holes in control linkage in order to reduce wear from use and vibration.

Clutch development.—Through extensive field survey we have found need for the development of friction clutches capable of the severe service encountered on drilling rigs. We have, therefore, developed manual and air-control clutches of various types for use in our drilling and servicing rigs. We are now using air-type friction clutches operating in oil, which provide an extremely flexible speed variation.

We have followed a practice of reducing vibration in our equipment by balancing all rotating parts such as clutches, sprockets, and brake flanges, thereby obtaining smooth operation and long life through reduction of vibration.

Parts Books and Records

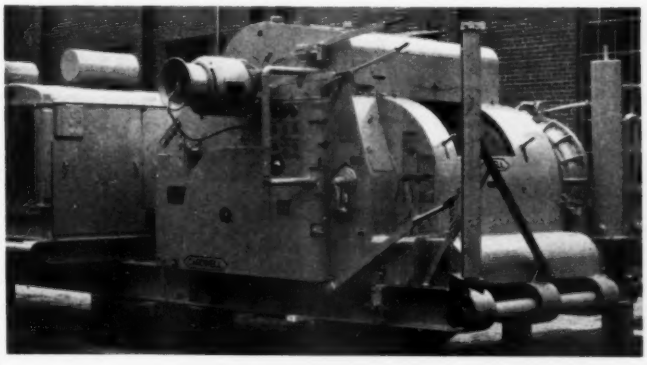
Customer service.—A need was recognized for an illustrative parts and instruction book to assist the customer in maintenance of the equipment. Cardwell developed illustrated instruction and parts books and records. In this way, an accurate parts record on each machine is established for the customer and is maintained at the factory.

Case histories of changes in the rigs themselves are accurately kept by the company parts department and are filed in all-steel, fireproof cabinets. Any changes or modifications of the machines that are made with the knowledge of cooperation of the engineering department are recorded for future reference.

Parts interchangeability.—The firm early recognized the necessity for interchangeability in rig parts. All service parts are interchangeable in the field without hand fitting. The length of time required to install a replacement is held to the minimum due to the close tolerance maintained in the manufacture of the replacement parts.

By these progressive and research methods, Cardwell during the past 25 years has provided low-cost and high-quality drilling and servicing rigs that were not only original in design but outstandingly in advance of the usual field practice.

Congratulations to CARDWELL on their 25th Anniversary . . . .



and all users of

KELCO CATHEADS

This Cardwell Draw Works with KelCo Catheads is a familiar unit in the oil fields. The picture shows a Cardwell Model O equipped with KELCO Model 12 Spinning and Breakout Catheads.

18 SO. MADISON

KELCO BEN F. KELLEY CO., Inc.
TULSA, OKLAHOMA

TELEPHONES
3-1425 3-0936

SPINNING LINE CATHEADS • BREAKOUT CATHEADS • AIR OPERATED POWER SLIPS • TUBING TONGS • SAFETY "C" POLISHED ROD CLAMPS

Executive Personnel and Key Employes of Cardwell

C. W. BARNHART
Production manager

E. F. BOWMAN
Purchasing agent

G. E. DRYDEN
Credit manager

GEORGE GOODWIN
Plant superintendent

GEORGE MARSH
Chief of final inspection

MRS. M. H. McKEE
Secretary-treasurer

MARVIN D. RASHER
Manager sales promotion and advertising

LEO SALISBURY
Assistant to chief production engineer

GROWTH and progress of Cardwell Manufacturing Co. has been due largely to efforts of the executive group shown on this page. Their composite experience in drilling and servicing problems has earned for Cardwell the special position it occupies today in oil-field equipment manufacturing.

H. W. Cardwell, president and founder of the organization, expanded the firm from a small beginning 25 years ago into a highly successful enterprise.

Harland W. Cardwell, Jr., executive vice president, worked his way through the company from service department to the executive position he now holds.

Gerald G. Brown, vice president in charge of research, started out with the company as a draftsman; his design experience helped enable the firm to become a leader in equipment building.

Arthur Harvey, vice president in charge of export, is well known in the industry and has served for many years as sales manager and general manager.

Mrs. M. H. McKee, secretary and treasurer, one of the foremost women executives in the Southwest, has served Cardwell for 15 years.

Robert M. Smith, sales manager, started out in 1939 as Illinois sales representative; he became sales manager the following year.

G. G. BROWN
Vice president, research

H. W. CARDWELL, JR.
Executive vice president

ARTHUR HARVEY
Vice president, export manager

J. H. LENHART
Assistant purchasing agent

L. MONTRE
Chief production engineer

CHARLES MOUSER
Service manager

ROBERT M. SMITH
Domestic sales manager

W. E. VOLKMAN
Assistant to vice president, export

(ABOVE)
AMERICAN IRON
SIMPLO-FRICTION
CATHEAD

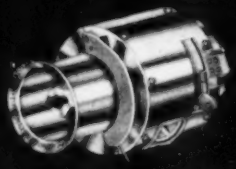
CONGRATULATIONS CARDWELL

on your 25th Anniversary

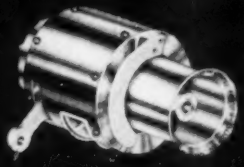
ONLY those companies which consistently "deliver the goods" can continue to grow as you have done. Your ceaseless efforts to produce quality products have placed Cardwell Drilling and Servicing Equipment in an enviable position in the oil industry!

We are appreciative of the fact that oftentimes American Iron Catheads and auxiliary equipment are used in conjunction with your rigs.

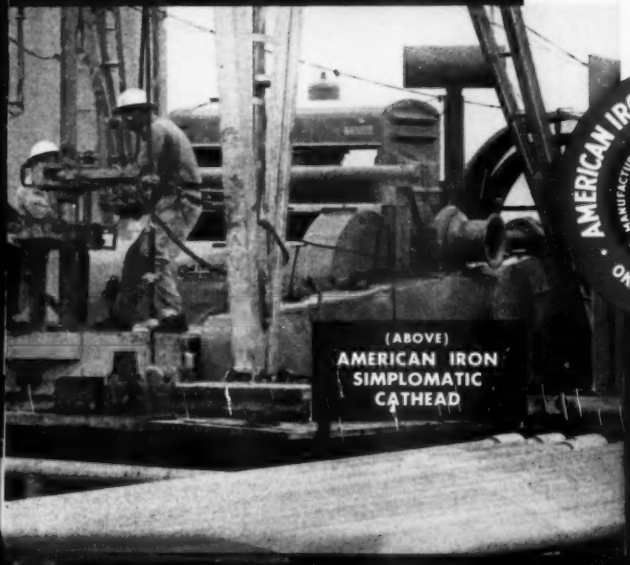
As shown in these photographs of Cardwell Rigs and by the drawings at left, American Iron Catheads are available in a choice of sizes and types for every drilling and servicing need!



(LEFT)
AMERICAN IRON
JUNIOR FRICTION
CATHEAD
– makeup



(LEFT)
AMERICAN IRON
JUNIOR FRICTION
CATHEAD
– breakout



(ABOVE)
AMERICAN IRON
SIMPLOMATIC
CATHEAD

AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF A OIL FIELD EQUIPMENT
OKLAHOMA CITY U.S.A.

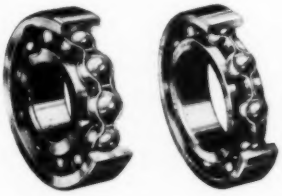
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
MEMBER

AMERICAN IRON & MACHINE WORKS CO.
OKLAHOMA CITY, OKLAHOMA • BOX 1177 • PH. L. D. 518
DISTRICT OFFICE: HOUSTON, TEXAS
EXPORT OFFICE: 11 WEST 42ND ST., N. Y. C.

A QUARTER CENTURY...

of consistent improvement in oil field drilling equipment is a record of which the Cardwell Manufacturing Company may well be proud.

. . . And over the years, their use of New Departure ball bearings evidences their demand for components of proven top quality and performance.



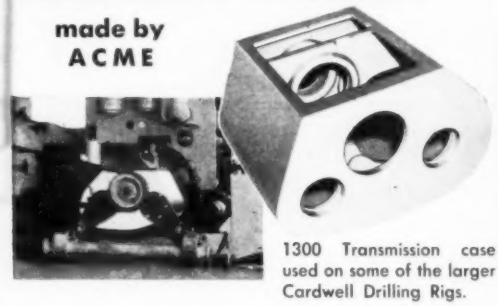
New Departure ball bearings are the product of over 60 years of precision manufacturing experience. New Departure, Division General Motors, Bristol, Connecticut.

Nothing Rolls Like a Ball

NEW DEPARTURE BALL BEARINGS

CARDWELL and other manufacturers like the advantages of SORBO-MAT CASTINGS

made by ACME



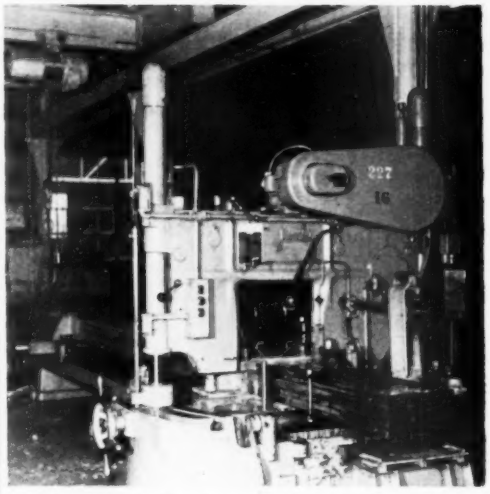
1300 Transmission case used on some of the larger Cardwell Drilling Rigs.

SORBO-MAT CASTINGS ARE: Free from hard spots and cavities, yet have easy machinability. Uniform high tensile strength and solidity with definite mechanical properties. For information and prompt delivery date, write

ACME FOUNDRY & MACHINE CO.
Coffeyville, Kansas

Suppliers of Gray Iron and Semi-Steel Castings for the Past 37 years.

MARVEL No. 18 POWER HACK SAW



Manufactured by Armstrong-Blum Company and sold to Cardwell Manufacturing Company by

PHILLIPS & EASTON SUPPLY COMPANY
244 South Wichita • Wichita, Kansas

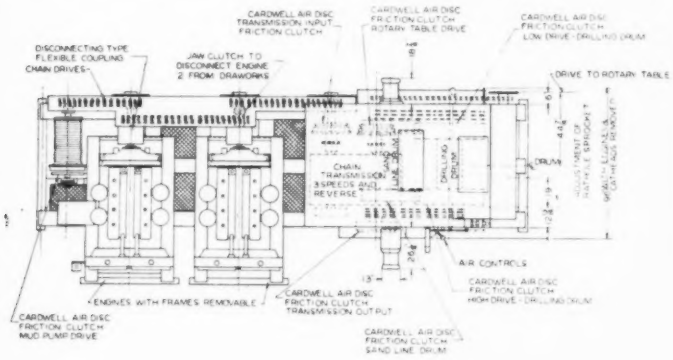
THE CARDWELL LINE

Model O Draw Works—8,000-10,000 Ft.

MODEL O is a completely air-controlled draw works. Air controls are provided for both clutch engagement and engine throttle control. A drive to each end of the drum provides two speeds for each of the three transmission ratios. The optional sand-line drum assembly is mounted on the cathead shaft and driven through an air friction clutch.

Mounted all on one three-rail skid, it is a highly portable unit. A hydromatic brake may be coupled directly to the end of the drum shaft. The rotary drive is direct from the output shaft of the transmission, thus the draw works' chains do not run except when hoisting.

Powered by two diesels (convertible to natural gas), a third engine for additional mud-pump power is optional. The Model O is rated for drilling to 8,000 ft. with 4½-in. drill pipe and 10,000-ft. workover service. The transmission includes a gear reverse, enclosed in a fabricated steel case, and provided with pump circulated lubrication.


CARDWELL AIR DISC TRANSMISSION INPUT FRICTION CLUTCH
CARDWELL AIR DISC FRICTION CLUTCH ROTARY TABLE DRIVE
CARDWELL AIR DISC FRICTION CLUTCH LOW DRIVE—DRILLING DRUM
DISCONNECTING TYPE FLEXIBLE COUPLING CHAIN DRIVES
JAW CLUTCH TO DISCONNECT ENGINE 2 FROM DRAWORKS
DRIVE TO ROTARY TABLE
CHAIN TRANSMISSION 3 SPEEDS AND REVERSE
DRILLING DRUM
DRUM
AIR CONTROLS
ENGINES WITH FRAMES REMOVABLE
CARDWELL AIR DISC FRICTION CLUTCH TRANSMISSION OUTPUT
CARDWELL AIR DISC FRICTION CLUTCH HIGH DRIVE—DRILLING DRUM
CARDWELL AIR DISC FRICTION CLUTCH MUD PUMP DRIVE
CARDWELL AIR DISC FRICTION CLUTCH SAND LINE DRUM

GENERAL SPECIFICATIONS MODEL O

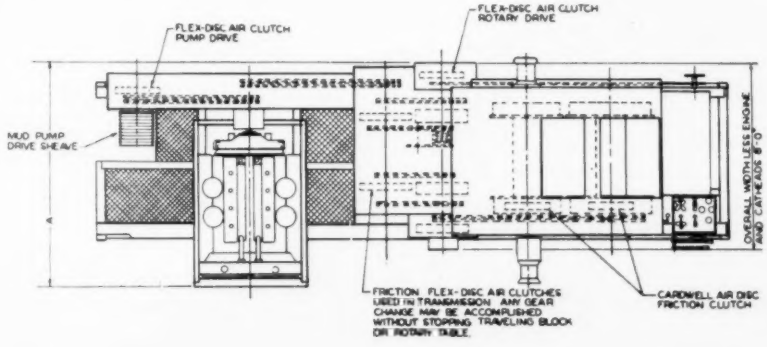
RATED DEPTH CAPACITY: 8,000 ft. to 10,000 ft. with 4½-in. drill pipe. CLUTCHES: Flex*Disc friction clutches used in both ends of main drum, and one end of sand-line drum. Flex*Disc friction clutches are used on main transmission output drive to draw works for input clutch to transmission and for the rotary and mud-pump drive. BRAKES: Self-energizing, full-wrap, single-adjustment type. ENGINES: Diesel engines are standard with oil bath air cleaner, oil filter, thermostat, and fuel filter. Gasoline engines are standard with oil filter, oil bath air cleaner, thermostat, oil safety vapor-proof magneto, and water-cooled exhaust manifold.

Model D Draw Works 5,000-8,000 Ft.

DESIGNED for drilling to 5,000 ft., the Model D is the newest of the Cardwell line, having been introduced early this year. The chain transmission is operated through air-controlled friction clutches running in oil, making it possible to change to any transmission speed without stopping the block. Rotary-table speeds are also changed without stopping the table. Slush-pump drive is operated from driller's position by air-controlled friction clutch. Model D is available with one or two drums and can be equipped with single engine up to 320 hp. or with two engines up to 160 hp. each. Ground bearing fits, balanced parts, and air-operated friction clutches reduce vibration to a minimum.

GENERAL SPECIFICATIONS MODEL D

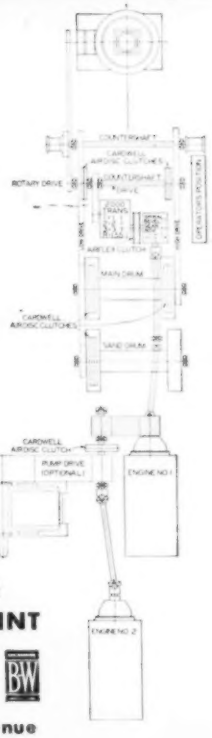
MAIN DRUM: Smooth barrel is standard, but removable grooved lagging can be furnished. Drum barrel is 16-in. diameter by 40¼-in. long. Main drum is operated by an air clutch mounted in the drum end. Drum capacity ranges from 3,660-ft. of 1⅛-in. to 6,350-ft. of ⅞-in. cable. SAND-LINE DRUM: This optional equipment is operated by an air clutch mounted in drum end. Capacity ranges from 10,320-ft. of ⅝-in. to 16,350-ft. of ½-in. line. BRAKES: Dual heavy-duty brakes are self-energizing, full-wrap type, with positive equalization. They are fully adjustable by a single turnbuckle. Main drum brake surface is 44 in. in diameter and uses 9-in.-wide by 1-in. thick lining. Sand drum brakes use brake surface diameter of 36 in. and 7-in. wide by ¾-in. thick lining. CHAIN TRANSMISSION: Four chain-type transmission is provided. Each drive is controlled by Flex* Disc air clutches. Manually controlled jaw clutch is used for engaging reverse drive.


FLEX-DISC AIR CLUTCH PUMP DRIVE
FLEX-DISC AIR CLUTCH ROTARY DRIVE
MUD PUMP DRIVE SHEAVE
OVERALL WIDTH LESS ENGINE AND CATHEAD 8'-0"
FRICTION, FLEX-DISC AIR CLUTCHES USED IN TRANSMISSION. ANY GEAR CHANGE MAY BE ACCOMPLISHED WITHOUT STOPPING TRAVELING BLOCK OR ROTARY TABLE.
CARDWELL AIR DISC FRICTION CLUTCH

The
CARDWELL TRAILERIG
for 5,000 foot DRILLING and 10,000 foot WORKOVER

transmits power dependably and efficiently thru

MECHANICS *Roller Bearing* **UNIVERSAL JOINTS**



For details concerning Oil Field applications, write —

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner
2052 Harrison Avenue
Rockford, Illinois

MECHANICS *Roller Bearing* **UNIVERSAL JOINTS**

congratulations

Cardwell Mfg. Co., Inc.
WICHITA · KANSAS

on your 25th Anniversary

Ehrsam Sorbo-Mat Process iron castings are being used in Cardwell equipment — these high-tensile castings are recommended for many oil field equipment uses.

ENGINEERS MACHINISTS FOUNDERS METAL FABRICATORS

THE J. B. EHRSAM & SONS MFG. CO.
ESTABLISHED 1872 ENTERPRISE, KANSAS, U.S.A.

Specify
PYLE-NATIONAL
Oil Derrick Lighting Equipment

for Quality · Durability · Long Service Life

- Vaportight Lighting Fixtures
- Vaportight Hand Lamps
- Switches and Circuit Breakers
- Plugs and Receptacles
- Conduit Fittings
- Floodlights
- Turbo-Generators
- Steam Turbines

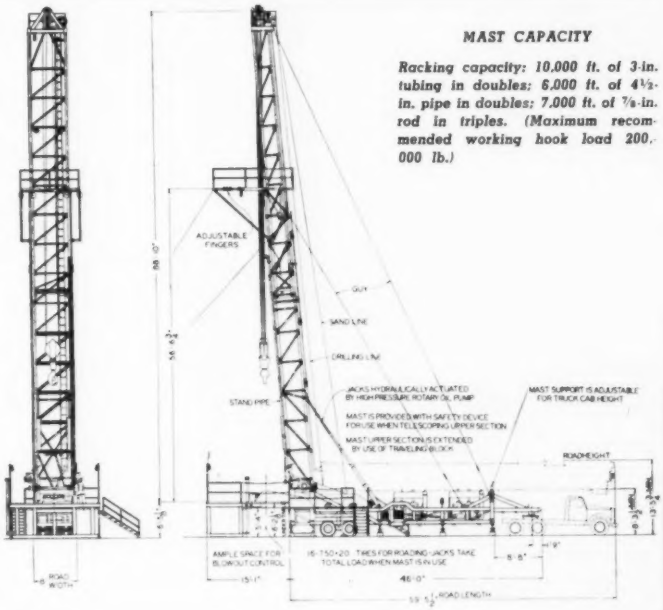
CONGRATULATIONS
CARDWELL MANUFACTURING COMPANY, INC.
ON YOUR 25th ANNIVERSARY

SINCE 1897
THE PYLE-NATIONAL COMPANY
1334 NORTH KOSTNER AVENUE CHICAGO 51, ILLINOIS
District Offices and Representatives in Principal Cities of the United States

THE CARDWELL LINE

Trailerig: 5,000 Ft. Drilling, 10,000 Ft. Workover

WITH the mast telescoped and folded down over the Trailerig, the machine is only 8 ft. wide, 13½ ft. high, and can be moved with a standard fifth-wheel-type truck tractor. The Trailerig is a unified design combining draw-works assembly with bridge-type trailer frame. It combines the large capacity of a full-scale 5,000-ft., double-drum, twin-engine draw works complete with a mast, in a portable machine. It is equipped with a mud-pump drive, a complete working platform including a builtin rathole digger, builtin stand pipe, tong-line counter-balances, and complete safety-type lighting system in conduit. The compact design makes it possible to move the machine on all ordinary highways and roads, and it can be safely tilted to an angle of 30°. The twin-engine drive of the Trailerig is so arranged that each engine is completely accessible. The mud-pump drive is incorporated in the engine-compound arrangement and driven through a Flex*Disc friction clutch.


ADJUSTABLE FINGERS
GUY
SAND LINE
DRILLING LINE
STAND PIPE
JACKS HYDRAULICALLY ACTUATED BY HIGH PRESSURE ROTARY OIL PUMP
MAST IS PROVIDED WITH SAFETY DEVICE FOR USE WHEN TELESCOPING UPPER SECTION
MAST UPPER SECTION IS EXTENDED BY USE OF TRAVELING BLOCK
MAST SUPPORT IS ADJUSTABLE FOR TRUCK CAB HEIGHT
ROAD HEIGHT
AMPLE SPACE FOR BLOWOUT CONTROL
15-TON 20" TIRES FOR ROADING-JACKS TAKE TOTAL LOAD WHEN MAST IS IN USE
ROAD WIDTH
ROAD LENGTH

MAST CAPACITY

Racking capacity: 10,000 ft. of 3-in. tubing in doubles; 6,000 ft. of 4½-in. pipe in doubles; 7,000 ft. of ⅞-in. rod in triples. (Maximum recommended working hook load 200,000 lb.)

GENERAL SPECIFICATIONS TRAILERIG

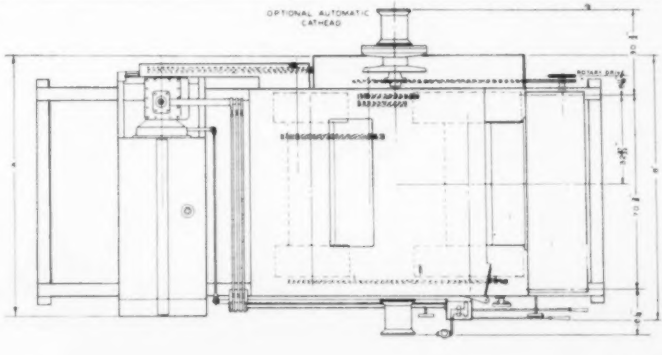
ENGINES: Gasoline engines are standard, with oil filters, oil-bath air cleaner, thermostat, oil safety switch, and vaporproof magneto. Diesel engines are standard with oil-bath air cleaner, oil filter, thermostat, and fuel filter. **TRANSMISSION:** Power is transmitted from engines through universal joint-equipped torque-tube drive to spiral level right-angle gear box to three-speed and reverse-helical-gear transmission of 2,000 ft.-lb. capacity. **BRAKES:** Self-energizing, full-wrap, single adjustment type, providing fully equalized braking action for both brakes. **CLUTCHES:** Flex*Disc friction clutches are used in both ends of main drum and one end of sand line drum. Flex*Disc friction clutches are used for rotary and mud pump drives and for countershaft drive. **MAST:** Four-leg telescoping mast of tubular construction. Hook-load capacity is 200,000 lb. with a safety factor of two. Equipped with four 23½-in.-o.d. sheaves and one 30-in. o.d. lead-in and one 30-in. o.d. sand-line sheave, permitting six or eight line operations.

Model L Single or Double Hoist or Draw Works

FOR 3,500-ft. drilling and 7,000-ft. workover and weighing only 12,000 lb., this lightweight draw works is easily transported and rigged up. It is available with a variety of engines for operation on gasoline, natural gas, butane, and diesel fuels. Either torque converter or gear transmission is available. It can be furnished with either single or double drum and the second drum can be added in the field. The HI-LO drive (necessary with torque converter), can be eliminated for servicing hoist use on a gear transmission-equipped unit if desired. Regardless of the combination of assemblies chosen, the Model L is designed so other combinations of equipment can be added later.

GENERAL SPECIFICATIONS MODEL L

RATED DEPTH CAPACITY: 3,500 ft. for drilling and 7,000 ft. for workover. **CONTROLS:** pneumatic. **TRANSMISSION:** Torque converter or gear, optional. **ENGINE:** Gasoline or diesel, optional. Choice of engine determines starting system. **CLUTCHES:** Flex*Disc clutches are in end of main drum and sand line drum, also used in HI-LO drive and rotary table drive. **BRAKES:** Self-energizing, full-wrap, single-adjustment type. Flanges are fabricated from special alloy steel, flame hardened to 550-600 Brinell hardness reading.



Here's all you need for field assembly

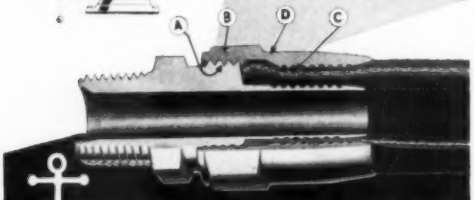
Oil-can

Wrench

Vise

HOW ANCHOR'S PATENTED REUSABLE COUPLING GRIP WORKS:

The thread on the body of the insert (A) and on the shell (B) is designed to insure positive engagement and minimize stripping. Our patented grip provides a uniform compression area (C) and additional packing of the hose in recess (D).



ANCHOR 2 piece Reusable Couplings

Makes Field Service Quick and Easy!

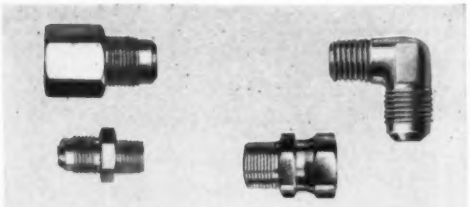
You'll really go for the convenience of Anchor Reusable Couplings. Assembly and disassembly in the field is quick and easy. No special tools required. Downtime kept to a minimum.

Couplings can be used again and again. You need no expensive inventories of prefabricated hose assemblies in varying lengths.

And the patented grip of Anchor Reusable Couplings gives an extra margin of safety against leaks and blowoffs.

Use Anchor Couplings — couplings that stand up to the most rugged field conditions . . . make servicing easy . . . reduce downtime . . . cut inventories. Write for latest bulletin.

P-2



Straight adapters, 90° elbows, adapter unions and related fittings make piping easier.

Also factory-assembled ductile sleeve couplings and field-service clamp-type couplings.

ANCHOR COUPLING CO. INC.

Factory: Libertyville, Ill. • Branch: Detroit, Mich

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CARDWELL
SERVING THE OIL INDUSTRY

on your

25th Anniversary

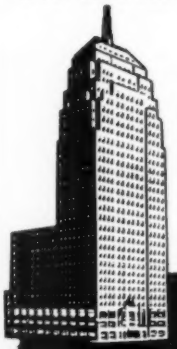
WINTER-WEISS CO.

2201 Blake Street
DENVER 2, COLO.

Manufacturers and distributors of transportation, farm and industrial equipment.

Congratulations, Cardwell,

on Your Achievements



We are proud that we have helped you to grow.

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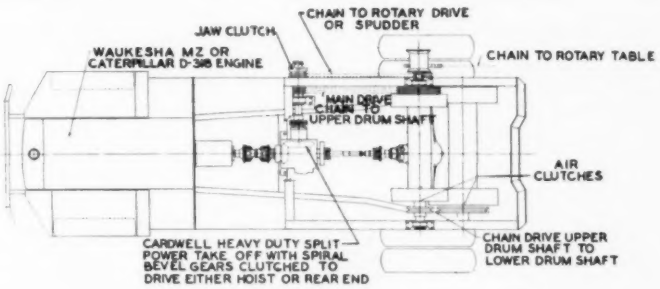
FIRST NATIONAL BANK
AND TRUST COMPANY
OF OKLAHOMA CITY

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

THE CARDWELL LINE

Mobilhoist

THE Mobilhoist is recommended for rods and tubing, bailing, and swabbing to 4,000 ft.; cleanout, well deepening, or drilling in behind rotary with cable tools to 3,200 ft.; rotary drilling with 3½-in. drill pipe to 2,000 ft.; or rotary servicing with tubing or 2⅞-in. drill pipe to 4,000 ft. The Mobilhoist MA is furnished with air disk friction clutches in both upper and lower drums. Clutches have high torque-load capacity and provide positive release for free spinning drum. The Mobilhoist MH is furnished with eight-jaw, dentil-type jaw clutches in both upper and lower drums. Telescoping support for engine clutch and throttle can be easily adjusted for operation from ground or derrick floor. Rotary table drive and spudding assemblies can be mounted on the Mobilhoist. Conversion from rotary to spudder, or spudder to rotary can be accomplished in a few minutes.


CHAIN TO ROTARY DRIVE OR SPUDDER
JAW CLUTCH
WAUKESHA MZ OR CATERPILLAR D-318 ENGINE
CHAIN TO ROTARY TABLE
MAIN DRIVE CHAIN TO UPPER DRUM SHAFT
AIR CLUTCHES
CARDWELL HEAVY DUTY SPLIT POWER TAKE OFF WITH SPIRAL BEVEL GEARS CLUTCHED TO DRIVE EITHER HOIST OR REAR END
CHAIN DRIVE UPPER DRUM SHAFT TO LOWER DRUM SHAFT

GENERAL SPECIFICATIONS MOBILHOIST

ENGINES: Waukesha MZ gasoline and Caterpillar D318 diesel engines optional. Waukesha MZ engine can be equipped for operation on natural gas or butane. **ROAD SPEED:** Mobilhoist has a maximum road speed of 30 m.p.h. **MASTS:** Single and double masts are optional. Mast can be laid aside for operation under a derrick. **FRAME:** Single-unit construction incorporates the chassis and hoist frame in a single unit. **CHAINS:** Diamond roller chains used on all drives.

Model S Single-Engine Draw Works

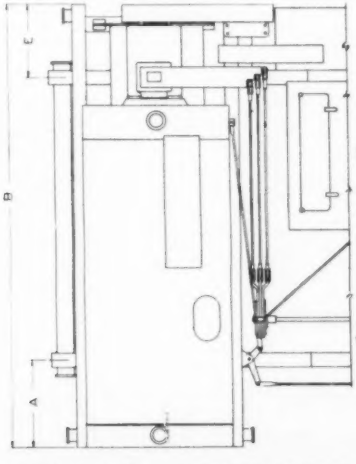
THIS unit is designed for 4,500-ft. drilling and 10,000-ft. workover. HI-LO drum drive, operated by air-friction clutches, makes it possible to double the line speed instantly without stopping the drum or the block. A brake is provided on the HI-LO shaft to stop rotation of transmission gears and permit quick gear changes. An air-operated countershaft brake is also provided to facilitate engagement of drum clutch. Rotary-table drive is operated by an air-friction clutch equipped with air-operated rotary-table brake. Rotary drive and rathole sprockets are mounted on shaft located in front of drum. Five-speed and reverse transmission with its high-torque capacity, makes possible the use of one large engine of high horsepower rating. Dual-safety, single-adjustment, fully equalized braking system enables one brake to operate independently and hold the load if the other brake should become damaged. Complete draw works with engine in place can be easily transported on one truck.

GENERAL SPECIFICATIONS MODEL S

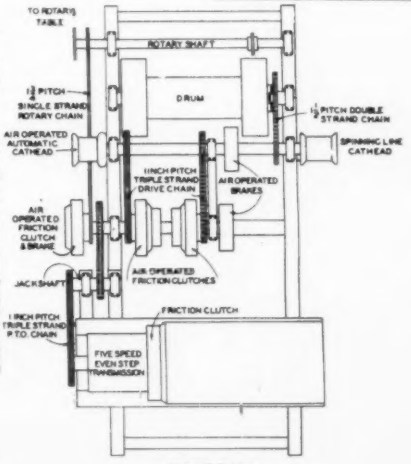
RATED DEPTH CAPACITY: Designed for 4,500-ft. drilling and 10,000-ft. workover.

BRAKES: Dual-safety, single adjustment, fully equalized. **ENGINES:** Standard with oil filters, oil-bath cleaner, thermostat, and gasoline-engine starting system.

TRANSMISSION: Heavy-duty, five-speed, even-step gear transmission mounted on flywheel housing. **DRUM DRIVE:** Air disk friction clutches give instant choice of two speeds to the drum. High speed is approximately double the low speed. Combination gives 10 speeds to drum. **TABLE DRIVE:** Air disk friction clutch operates rotary drive and air-operated brake stops table.



THE WEIGHT OF LONGER ENGINES IS EQUALIZED AS SHOWN BY USE OF JACKSHAFT



POWER FLOW

THE CARDWELL LINE

Combination Drilling And Servicing Rigs

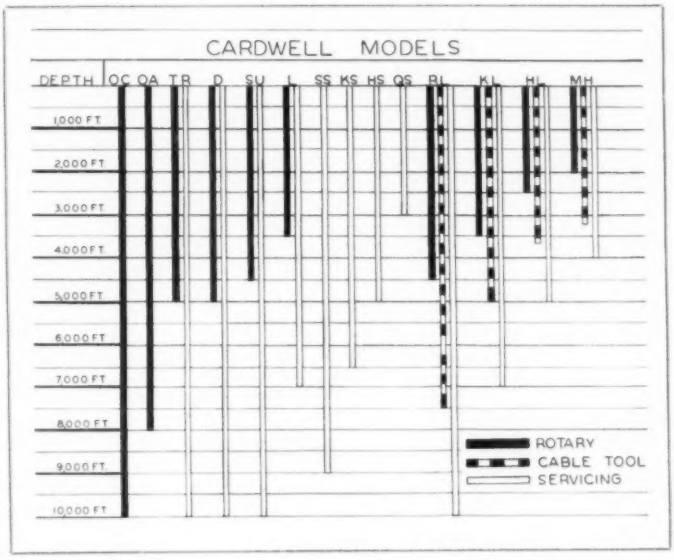
THE three models of double drum hoists, the H, the K, and the R, are all essentially identical in design and include a high percentage of interchangeable parts. The basic machine is a double-drum hoist to which can be added various attachments to make the machine suitable for cable-tool work, either spudder or beam; rotary drilling or workover jobs, and well servicing. Each model is available with a choice of gasoline or diesel engine to suit fuel requirements. Adding a spudder assembly provides a cable tool rig for drilling or service work. A rotary table drive can also be installed. A beam assembly is available for the model R only.

GENERAL SPECIFICATIONS H-K-R

DRUMS: Drum barrels are of laminated-steel double-plate construction, cold rolled, and electrically welded. CLUTCHES: Drum clutches are fan-shaped, eight-jaw, dentil-type of cast-alloy steel. Jaws are jig machined with bevel undercut. Contracting - band - type friction clutches are mounted on the countershaft, providing friction drives to both drums and cathead shaft.

Drilling, Servicing Masts

CARDWELL single and double-leg masts are designed to handle well servicing, rotary or cable-tool drilling, or workover jobs. Masts are available for single and double-drum skid-type hoists, draw works, cable-tool rigs, and Mobilhoists. A 48-ft. single-leg servicing mast is equipped with a two-sheave opposed-type crown which provides for longer block travel. Fifty-five-foot single and double-leg servicing masts are furnished with three sheaves in line in crown. Sprocket for operation with jerk-line spudder is available in place of center sheave. When extended, upper sections of masts can be securely locked in any of several positions. Drilling mast is suitable for rotary drilling as well as servicing and cable-tool operation. Upper section is securely locked in position by rotating lock ring. The four crown sheaves are made of heat-treated manganese-alloy steel and mounted on shielded roller bearings. The 65-ft. mast is mounted on a trunnion mast support and is arranged to fold back over the hoist. It can be readily laid aside for derrick operation. A subframe is provided to unitize the mast and hoist for easy transportation. Racking platform is available with the 65-ft. mast and will hold 88 stands of 4½-in. drill pipe.



Single-Drum Servicing Hoists

THE single-drum Model S can be used for all types of well servicing to 9,000 ft., and when equipped with a rotary drive can also handle rotary workover jobs. It can be mounted on a truck and used with a conventional derrick or truck-mounted mast. Used with a double leg mast and subframe, the single-drum Model S is a heavy-duty servicing and workover unit. The single-drum Model H is recommended for well servicing to 5,000 ft. and the single-drum Model K is recommended to 6,500 ft. Models H and K are essentially identical, differing only in size and capacity. Both are available with the Flex*Disc friction clutch in the drum, or with jaw clutch. Model Q, smallest in the line, is recommended for well servicing to 3,000 ft. It can be used as a skid hoist but is usually mounted on a light truck, with a single-pole mast. Ground controls allow the operator to work as one of the crew.

Single and Two-Speed Mud-Pump Drives

Single speed.—The pump is driven by V-belt from an enclosed plate clutch power takeoff which is manually operated. V-belt is shielded by removable wire-mesh shield.

The pump is mounted on a main frame with engine and engine frame. Mud-pump and engine assemblies are mounted on three-rail skid, making entire unit easy to move.

Double speed.—The two-speed mud pump drive for drilling and workover jobs finds application where high pressures for short periods are required.

High ratio of the two-speed drive is the same as would be furnished normally for a single-speed pump drive, and the low side is set at half top speed. With engine in low drive, pressure developed in fluid end of pump is doubled. Extremely high pressures secured from this unit are applicable when flow is restricted in bore-hole due to stuck drill pipe, cave-ins, and the like. With such pressures available (ranging as high as 2,500 psi. on some makes of pumps) it is possible for operator to kill a high-pressure well without calling in special equipment for that purpose.

The two-speed mud-pump drive is desirable in rotary drilling because the capacity of a high-pressure pump is instantly available if operator encounters unexpected well conditions.

A gear-tooth-type clutch is used on the driven shaft of transmission to alternately connect either drive. Sheave is provided on driven shaft of transmission for connection by V-belt to pump sheave. Lubrication in chain transmission is by flinger which distributes oil to chains and bearings. Bearings are all self-aligning spherical roller type. Shafts are of alloy steel of ample size. All controls are manual.

Miniature Models

Trailerig and Model 38 clutch made by shop men

PRECISION true-scale models of drilling and servicing rigs and parts are of high interest value to industrial designers as well as purchasers. Apart from their purely commercial value to the company, miniature designs are in popular demand for display at public technical expositions and in educational institutions.

Symmetry of design, closely allied with engineering balance, is heightened and intensified in true-scale miniature models, whether a clutch assembly or a complete rig layout.

Cardwell sponsored construction in 1939 of two small-scale models of Model 38 Flex*Disc clutch. Edward Fine, tooling foreman, and Albert Widener, tool-room employe, built the exhibit shown in an accompanying photograph. Structural sections, drawn from original engineering department blueprints, were hand-made and brazed. Finished models were insured for $2,000 each by the company.

First shown at the World's Fair in New York City, many leading educational institutions asked to display the models; these included Missouri School of Mines, Rolla; Colorado School of Mines, Golden; Texas A. & M. College, College Station; and Kansas State University.

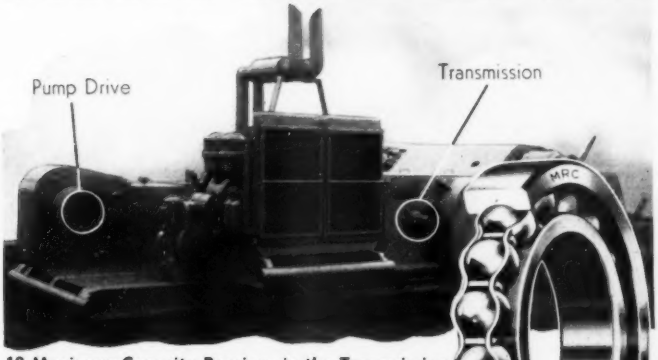
*Edward Fine, tooling foreman, and Albert Widener, tool-room employe, are shown assembling a true-scale model of a Model 38 Flex*Disc clutch.*

Trailerig.—A true scale model of Trailerig was built early this year by Bart O. Beemer of the engineering department. Beemer reproduced details of the original design which contains a broad working platform, substructure, and builtin rathole digger. Model construction was of bamboo, joined with airplane cement.

M-R-C Ball Bearings

contribute to the efficiency of

CARDWELL Model D Draw Works



18 Maximum-Capacity Bearings in the Transmission

2 Maximum-Capacity Bearings in the Pump Drive

MARLIN-ROCKWELL CORPORATION

Executive Offices Jamestown, N. Y.

That old rabbit need'nt worry, Scottie McBlock's just out for a BANG-UP salute to Cardwell!

There are no BETTER rigs than Cardwell

There are no BETTER blocks than McKissick

TYPE R-P TRAVELING BLOCKS

are preferred stock with contractors, operators and oil companies because they're **BETTER BUILT** for

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Write for catalog on this and other McKissick Products

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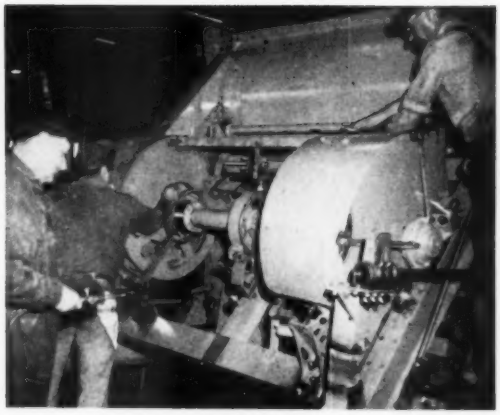


Final assembly operations on Model R—combination rotary and cable-tool drilling.

Machinist using modern carbide tool-cutting steels on a precision lathe operation.

MODERN SHOP TECHNIQUES

by Harland W. Cardwell, Jr.*

A DEFINITE manufacturing objective was predominant in founding of the Cardwell organization a quarter of a century ago. That objective was embodied in the idea that there was a place in the industry for a manufacturer who would use modern, automotive engineering practice in building oil-field hoists and drilling equipment.

Prior to 1926, the use of cast-iron clutches, cast-iron parts, and cast-iron chains with cast sprockets was widespread; none of these parts was heat treated. Cardwell started its existence by adoption of current automotive manufacturing processes, use of alloy steels, and heat treating of all parts. All sprockets, for example, were made of steel and subjected to special heat-treatment procedures. The firm was the first company to convert completely from the use of standard tool steels to the use of carbides.

*Executive vice president, Cardwell Manufacturing Co., Wichita.

Heat-treated parts.—As a result of intensive research, all toggles on Cardwell drilling rigs have heat-treated beams and heat-treated holes to obtain proper fit and prevent excessive wear. As a result, the firm is selling fewer repairs now than it did 4 years ago and today Cardwell has 1,200 more rigs in service than in 1947. Parts are built to a tolerance of 0.0001.

Brake flanges.—Early in the history of drilling-rig manufacturing, the firm found that the single largest expense item of a drilling contractor was brake flanges. Some would not last a month on some rigs. Brake flanges were made of cast iron, were rough machined, and in some cases were not properly finished.

Cardwell builds brake flanges that are heat treated to a Brinell hardness reading of 550, and are case hardened ¼ in. in depth. The smooth surface not only aids in braking capacity but adds considerably to the life of the brake blocks.

Vibration elimination. — In drilling and servicing rig design, the company has devoted considerable attention to elimination of vibration. Vibration is largely due to improper machining or improper balancing of parts. All brake flanges, sprockets, and clutches are carefully balanced before they go into the machine. If a drum, 44 in. in diameter, has a misalignment of 0.0008 in., it is discarded.

Metallurgical control. — A. F. Schroeder, chief metallurgist, checks all classifications of raw materials to determine proper specifications. As materials are released for consumption, laboratory number is shown thereon to assure that the correct material is being used. Detailed record of all heat-treating processes are maintained constantly. Specifications are recorded especially on materials used for highly stressed parts.

Materials control.—All orders released to plant are processed to the extent that each operation is outlined thoroughly in order to maintain a closely controlled material problem as well as to guide time element.

Congratulations

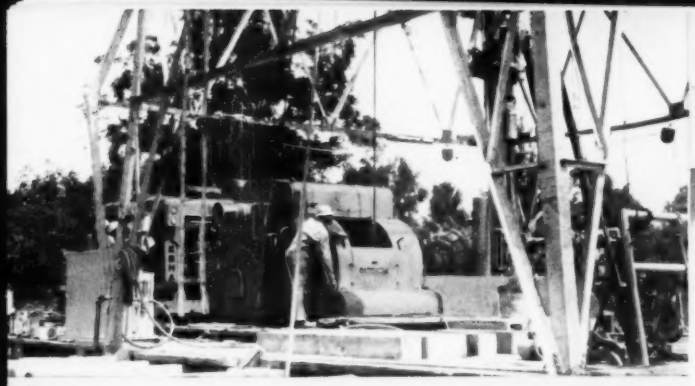
CARDWELL MFG. CO. INC.

SUCCESSORS TO SPENCER TRAILER CO.

Spencer-Safford Loadcraft INC.
AUGUSTA, KANSAS
ESTABLISHED 1916

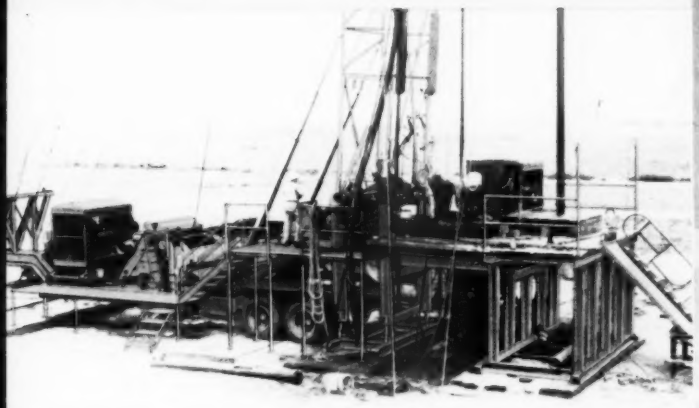
. . . on your 25th anniversary. Your world wide acceptance is proof positive of your position in the oil fields of the world. Incidentally, we think you know a good trailer when you see one.

Shown above is the famous "CARDWELL TRAILERIG" complete with a Spencer-Safford Loadcraft trailer.

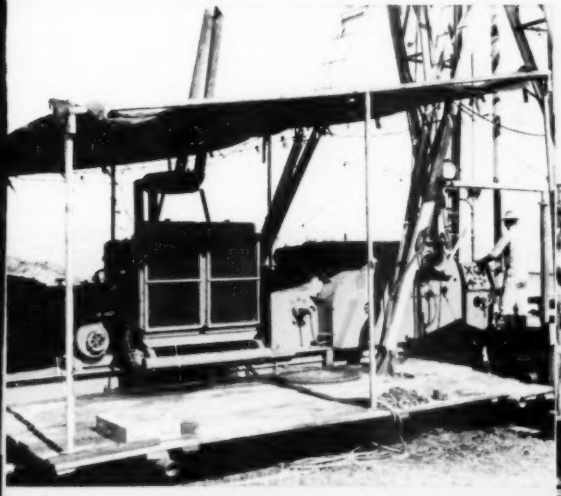


Model O air-controlled friction clutch driven draw works. Available with two or three engines and torque converter for drilling from 6,000 to 10,000 feet.

The Trailerig is a completely equipped, portable 5,000-foot drilling rig. Friction clutch driven throughout, the Trailerig combines fast operation with minimum rig-up time and expense.

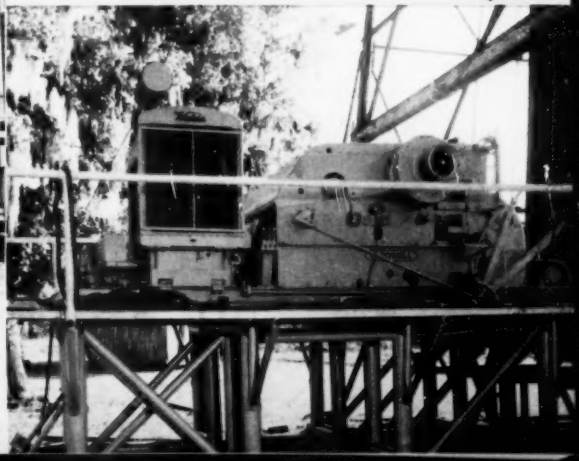


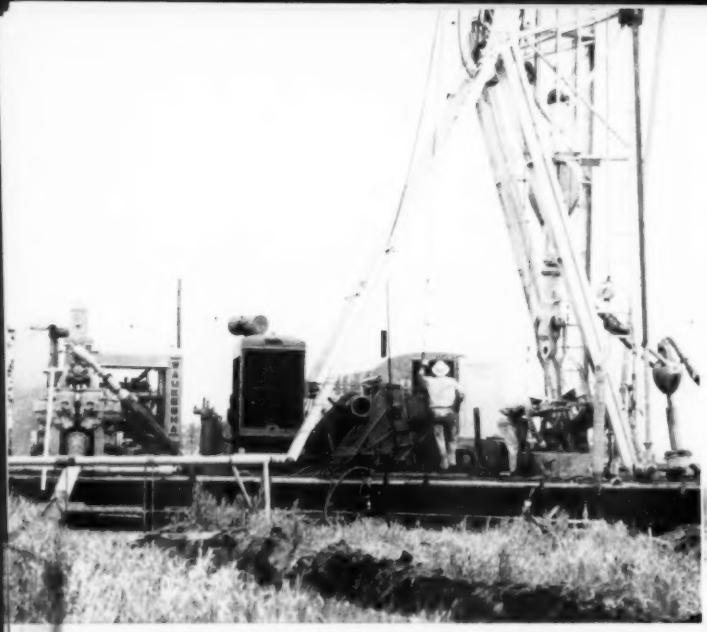
Trailermast, combined with an old or new draw works, makes a portable rig that can be moved complete and rigged up in a few minutes. Two sizes, 90 and 96 feet in height.



Model D is the most modern draw works ever developed. Completely air clutch driven, including the drives in the chain transmission. The Model D is a fast, compact, 5,000-foot rig.

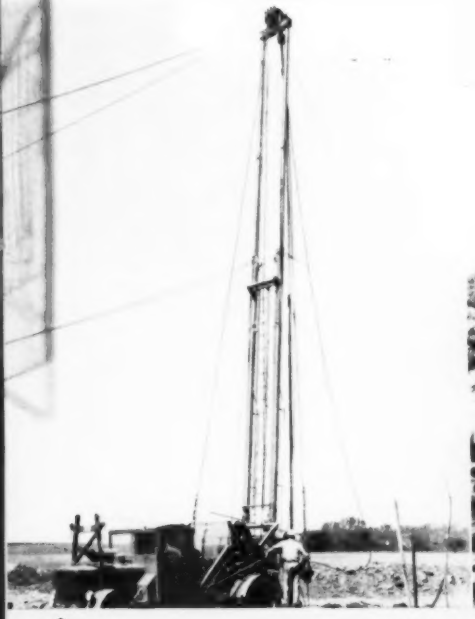
Model L is the lightest weight and most up-to-date 3,500-foot draw works built. All drives, and the sand line and main drum, are friction clutch driven and controlled by air.



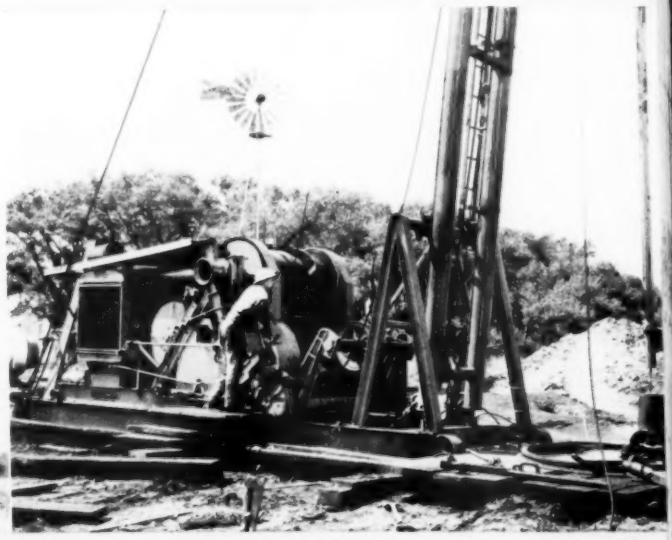


Model S is a compact, fast-operating draw works with dual drum drives operated by air friction clutches. It is available with a wide range of engines and recommended for 5,000-foot drilling.

Model H or Model K single drum servicing hoist. These hoists have become the standard throughout the world-wide oil industry. They are available in four sizes for servicing from 1,500 to 10,000 feet.



The fast moving, pneumatic-tired, self-propelled Mobilhoist is a self-contained servicing or workover rig for rotary or cable tool jobs. Air friction clutches drive both upper and lower drums.



Model R combination rotary and cable tool rig. The design, construction, and operating efficiency of this rig have made it the most popular rig ever built. Built in two smaller sizes, this rig is recommended for rotary drilling to 4,500 feet, cable tool drilling to 7,500 feet and servicing jobs to 10,000 feet.

CARDWELL

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TWENTY-FIVE YEARS CARDWELL SERVING THE OIL INDUSTRY

NATURAL GAS

Cities Service Plans Use of Kansas Pools for Storage

BARTLESVILLE, Okla.—Cities Service Gas Co. plans to acquire the Colony and McLouth gas fields in Leavenworth and Jefferson counties, Kansas, both depleted, for underground storage of natural gas.

An application for authorization to acquire the fields and build facilities necessary to operate them has been filed with the Federal Power Commission in Washington.

Cities Service officials think that gas-storage leases on a major portion of both fields can be obtained. If negotiations for these leases do not go through, the company says it will institute condemnation proceedings under provisions of a new Kansas law. The law grants the right of eminent domain to natural-gas companies seeking property for underground-storage projects.

The company is also seeking the FPC green light to replace 10 miles of double 16-in. lines between the Welda and Ottawa compressor stations in Franklin County, Kansas, with a single 26-in. line.

Installation of the new facilities is expected to increase maximum winter daily deliverability of the system by 120,000,000 cu. ft. Much of the additional capacity would go to meeting increased demands in the Kansas City area.

Estimated cost of the whole project is $3,471,627.

Columbia Buys More Gas to Avert Appalachian Shortage

NEW YORK.—Columbia Gas System, Inc., has acted to insure an adequate supply of natural gas for its system in the Appalachian area during the coming winter season.

Columbia has made arrangements with Transcontinental Gas Pipe Line Corp. and four of Transco's customers to secure new deliveries of more than 100,000,000 cu. ft. per day for summer storage.

Details of the new agreement were worked out at conferences attended by representatives of the Federal Power Commission, New York Public Service Commission, Transco, Columbia, Consolidated Edison Co. of New York, Inc., Brooklyn Union Gas Co., Public Service Electric & Gas Co., and Philadelphia Gas Works Co. The latter four companies are customers of Transco.

The new deliveries to Columbia will come from gas now being used as boiler fuel by the four customer companies. This gas will be made available for delivery to Columbia at a connection on the Transco system near Rockville, Md. Gas can start moving to Columbia at once since FPC has waived the customary 30-day notice of changes in rates.

The customer companies will be credited 30 cents per M.c.f. for the gas made available, and Transco will charge Columbia the same price.

Columbia presently has about 97 billion cubic feet of gas stored in underground reservoirs, and hopes to increase this amount to 160 billion by October. The system also is buying surplus gas from other pipe-line firms when possible.

Los Angeles Companies Plan Expansion of Big Gas Line

WASHINGTON.—A plan to hike capacity of the big 30-in. natural-gas trunk line from the Arizona-California border to the Los Angeles area was placed before the Federal Power Commission for approval late last week.

Southern California Gas Co. and Southern Counties Gas Co. of California, in a joint application, asked FPC to approve construction involving an increase in deliverability from 405,000,000 to 555,000,000 cu. ft. per day.

The two companies would build 81 miles of 30-in. loop in southern California along the existing line between Whitewater and Desert Center. They would also construct a 6-mile loop between the Blythe, Calif., compressor station and the Arizona border.

Gas for the California line is received at the border from El Paso Natural Gas Co. The companies said El Paso has agreed to supply the additional 150,000,000 cu. ft. when necessary facilities, now before the FPC for authorization, are completed.

Natural Gas, Butadiene Used To Make Nylon Intermediate

VICTORIA, Tex.—Natural gas and butadiene are being used to produce an intermediate chemical for nylon at E. I. du Pont de Nemours & Co., Inc.'s, multimillion-dollar plant just placed in operation 10 miles south of this city. Natural gas is coming from gas wells located in the near vicinity, while the butadiene is being received from other plants along the Gulf Coast.

The product manufactured here is the initial step in converting petroleum products into nylon yarns and plastics. The adiponitrile manufactured at Victoria is further processed in other plants in Texas and on the East Coast.

Natural gas serves the new plant as a source of hydrogen, which is obtained from methane, and as a fuel for some of the manufacturing processes.

Before construction of the originally planned plant had been completed, work was begun on facilities to double the capacity. Construction of this second unit, started last fall, is expected to be completed during the final quarter of this year.

The Victoria plant is situated on a small part of a 1,725-acre tract lying along the Guadalupe River. In the main, manufacturing takes place in six buildings. These are supplemented by tank farms; a powerhouse for generating process steam; and the semiworks, where research will be conducted almost constantly on plant-process improvement.

GROWING GARVIN.—This big absorber, capable of processing 60,000,000 cu. ft. of gas daily at 750 psi., is shown on its way to the southwestern Antioch Gibson Sand Unit of the Garvin County Plants. The 136,700-lb. absorber was shipped by a California fabricator and required the use of three flat cars. It will be part of an expansion program which will enlarge capacity of the plants from 120,000,000 to 200,000,000 cu. ft. of gas per day by January 1952.

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Among the Drilling Contractors

Eight Contractors Active In Elk City Development

Nineteen 10,000-ft. rotary rigs, representing 8 drilling contractors, are being kept busy in the Elk City field, Beckham and Washita counties, western Oklahoma, in one of the largest concentrations of heavy-duty drilling equipment in the Southwest.

Eleven of the 19 rigs are working for Shell Oil Co., principal operator, and the remaining 8 for various other operators, including Union Producing Co., United Carbon Co., Howell & Howell and Walter Duncan, Northern Ordnance, and Decem Drilling Co. (own account).

Arrow Drilling Co. has drilled the deepest well in the field proper to date. Its No. 38 rig, an Emsco J-1250 assembly, drilled Union Producing Co. 1-B W. T. Music, C NW NE 26-10n-21w, to a total depth of 13,576 ft. This well at latest report was in process of testing a deep zone around 11,850 ft. It has 7-in. casing to 11,856 ft. with 5½-in. liner to 13,287 ft.

Big Chief Drilling Co. has been in the field since its discovery with two rigs in continuous operation. One of its rigs, an Emsco J-1250 assembly, equipped with 143-ft. mast, has drilled 8 wells and has never been torn down. On one skid job, the rig was moved 4½ miles in a single day, working only during daylight.

Drilling contractors working in the field are:

Contractor—	No. rigs
Arrow Drilling Co., Tulsa	1
Big Chief Drilling Co., Tulsa	2
Decem Drilling Co., Oklahoma City	2
Falcon Seaboard Drilling Co., Oklahoma City	2
Helmerich & Payne, Inc., Tulsa	4
Olson Drilling Co., Tulsa	5
Reading & Bates, Inc., Tulsa	2
Williams-Copeland, Inc., Tulsa	1
Total	19

Jackson Completes Experimental Hole

L. B. Jackson Drilling Co., Tulsa, has just completed an experimental test hole drilled under contract for Well Surveys, Inc. The hole, located at the latter company's field laboratory 9 miles east of downtown Tulsa in 31-20n-14e, and used for correlating data obtained by coring and various logging methods, was carried to a total depth of 1,335 ft.

Hole from a depth of 40 ft. was cored continuously with a diamond head under direction of Diamond Oil Well Drilling Co. An 8¾-in. head was run, giving a 4⅜-in. core. Recovery was 97 per cent. Hole averaged 56 ft. per day with down-time for tests and study.

48 Wells Contracted

Contracts for 48 additional wells to be drilled in the Elk Hills naval reserve, California, have been awarded by Standard Oil Co. of California, the operator, to Neal Ammons Drilling Co., Tine Gaiser, and Krug Exploration & Drilling Co. Each contractor will drill 16 wells.

Lee Chisholm, formerly branch manager of Shaffer Tool Works at Ventura, Calif., has joined **Stansbury, Inc.,** drilling contractors, of Bakersfield, Calif.

Corbett-Barbour Drilling Co., Tulsa, has a rig on a wildcat location 3 miles east and a mile north of Prague, in Lincoln County, Oklahoma, where it is drilling a Wilcox sand test for Flynn Oil Co. Location is for 1 Terry, SW SW SE 14-12n-6e. Contract calls for 4,800 ft.

J. L. Warton, Carmi, Ill., has moved two rotary rigs to the Midland area in Michigan where he has contracts for drilling brine wells for Dow Chemical Co. "Froggie" Hall will be toolpusher on the job.

E. A. Rumley Drilling Co., Oklahoma City, has started drilling on a projected 9,000-ft. test located about 1½ miles northeast of the one-well Northwest Norman pool in Cleveland County, Oklahoma. The project is a contract job for Wilbur Keith. Location is for 1 Gross, NW NW NW 9-9n-3w.

Falcon Seaboard Drilling Co., Tulsa, is drilling a 4,500-ft. test northeast of the Fitts field, Pontotoc County, Oklahoma, for Paul Collsman. Location is in the NE SE NW 32-3n-8e, on the operator's Miller lease.

Penrod Drilling Co., Shreveport, is starting work on two wildcat tests in Concordia Parish, eastern Louisiana. Both are being drilled for H. L. Hunt, with whose interests the contracting company is affiliated. One test, projected to 7,000 ft., is the operator's 1-E Fisher, located in 25-7n-9e, about 2½ miles southwest of Vidalia. The other is 2-E Fisher, in 15-6n-7e, 2 miles east of Lismore.

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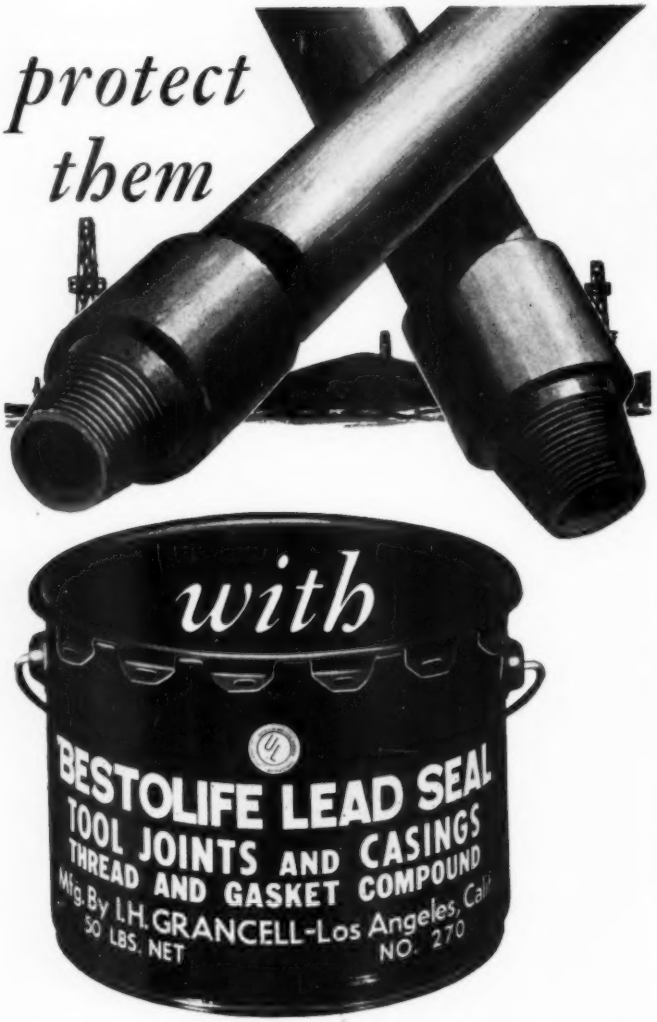

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Calif., has contracted for two wildcat tests to be drilled for D. D. Feldman. One will be located in 2-13n-14e, Sutter County, California, and the other in 7-14n-3e, Yuba County.

Woody Hawkins is the contractor on a projected 6,000-ft. test which Skelly Oil Co. is starting on the Nokai Dome in southwest San Juan County, Utah. The test, a rank wildcat, is Skelly's 1 Unit, located in the C SW SE 27-40-12e.

Longhorn Drilling Corp., San Antonio and Three Rivers, Tex., has the contract for a 6,200-ft. wildcat test to be drilled for Sid Katz, Inc., of San Antonio, in Section 20, Horton Survey, Frio County, southwestern Texas. The test is designated as 1 E. D. Simmons. Drilling also is under way on a projected 6,000-ft. wildcat test in LaSalle County. The latter test is being put down for Henderson Coquat, one of the owners of the contracting company, and O. R. Mitchell. It is 1 Carlos Pena, Section 19, Block 2, INGN RR Survey.

Trigg Drilling Co., Oklahoma City, has a contract from Carter Oil Co. for a well to be drilled in the newly opened Southeast Rich Valley pool, Grant County, northern Oklahoma. The well, 1 Shrubshall, C SE SW NE 6-25n-4w, is a northeast diagonal offset to the discovery well, Sinclair Oil & Gas Co. 1 Mulkey, which produces from the second Wilcox sand at 5,816-20 ft.

Tiger Drilling Co., Oklahoma City, is drilling for its affiliated company, Josaline Production Co., at 1 State, SW SW SE 36-16n-4e, a wildcat test located 4 miles northwest of Kendrick, Lincoln County, Oklahoma.

Frontier Drilling Co., Denver, is drilling on a contract with C. E. Miller and Dean Sacks at a wildcat location 2½ miles northwest of Walker field, Logan County, Colorado. Contract calls for a test through the Dakota series. Locations is on the Wilson lease in the SW SW NW 14-9n-54w.

ACTIVE ROTARY RIGS*
(United States and Western Canada)

Area—	Week ended 6-18-51	Change week ended 6-11-51	Change week ended 6-19-50
Gulf Coast	582	+ 9	+ 83
W. Tex.-N. M.	886	+ 5	+144
Ark.-N. La.-E. Tex.	154	0	+ 5
Oklahoma	260	— 9	— 37
Kansas-S. Nebraska	169	—11	+ 30
Illinois-Eastern	162	+ 9	+ 22
Rocky Mountains	150	— 4	+ 49
Pacific Coast	143	+ 3	+ 11
Total U. S.	2,506	+ 2	+307
Western Canada	125	— 8	+ 40
Total	2,631	— 6	+347

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the West Texas-New Mexico and Oklahoma-Kansas areas are shown on pages 170 and 171.

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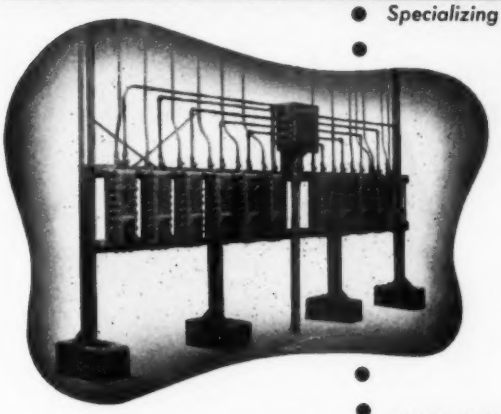

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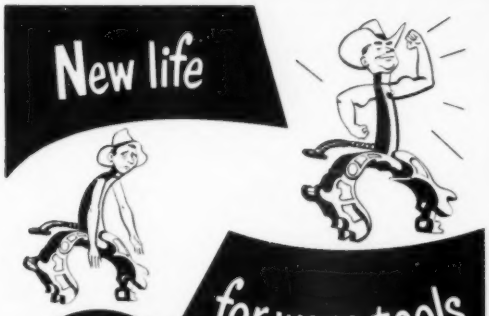

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PIPE LINES

Mid-Valley Plans Major Step Up of System Capacity

LONGVIEW, Tex.—Mid-Valley Pipeline Co. has announced plans for increasing capacity all along the route of its 1,000-mile crude-oil line from eastern Texas to Ohio.

The company will build six new booster stations at points along the 565-mile section of 22-in. line from Mayersville, Miss., to Hebron, Ky. The new stations will step up capacity of this section from 155,000 to 235,000 bbl. per day. Proportionate increases are planned for sections from Longview to Mayersville and from Hebron to Lima, Ohio.

The new booster stations will be located at Stevenson, La.; Minter City, Miss.; Hornsby, Tenn.; Elkton and Simpsonville, Ky.; and Pyrmont, Ohio. In addition, another pumping unit will be installed in each of the existing main-line stations. *(The Oil and Gas Journal, June 21, page 353).* Microwave - communications equipment will be installed at each new station.

The capacity increase is expected to cost more than $8,000,000. If materials can be obtained satisfactorily, completion is expected early in 1952.

The Mid-Valley line will connect with the projected West Texas-Gulf line through a 20-in. spur from Longview, Mid-Valley's southern terminal, to Wortham, Tex. Joint owners of the company, Sun Oil Co. and Standard Oil Co. (Ohio), are also participants in the pending construction of the West Texas-Gulf trunk line along with Gulf Oil Corp., Cities Service, and Pure Oil Co.

Sinclair to Move Products By Common-Carrier Setup

NEW YORK.—Sinclair Oil Corp. is preparing for construction of terminal facilities to handle products moved under common-carrier arrangements through the lines of two other companies.

Arrangements call for moving products through the Plantation Pipe Line Co. system from Baton Rouge to Grennsboro, N. C.; and through a converted crude-oil line from Wood River, Ill., to Indianapolis.

Land has been bought and tankage has been ordered by Sinclair for terminal facilities near eight terminal points on the Plantation system. These terminal facilities will be near all Plantation terminal points with the exception of Collins, Miss., in an area where Sinclair is not active, and at Atlanta, where Sinclair will use Southeastern Pipe Line Co. terminal facilities.

Due to materials-procurement difficulties, the terminals are not expected to be in operation before completion of Plantation's expansion program late this year. Each Sinclair terminal is expected to cost about $300,000 including piping, loading racks, and tankage.

The company plans to move two grades of gasoline and No. 2 heating oil through the Plantation system.

Four different methods are considered for moving products from the Houston area to the Plantation receiving terminal at Baton Rouge. Pending formulation of final plans, it has been indicated that tankers—not barges—would be used between the two points.

Sinclair also has arranged for the movement of products from Wood River, Ill., to Indianapolis through another company's line which will be converted from crude oil to products service. This line is to be extended from a point 18 miles north of Indianapolis southward into the city to a terminal to be built for Sinclair and Phillips Petroleum Co. It is scheduled for completion this fall, perhaps as early as September.

Phillips Plans 498 Miles Of Products-Line Looping

BARTLESVILLE, Okla.—Phillips Petroleum Co. is preparing to embark on a pipe-line construction project which will provide a major increase in capacity on its products system between Borger, Tex., and Chicago.

Plans call for laying 498 miles of looping along a little less than a third of the entire length of the existing system.

Construction will be split up in three sections: from Borger to Paola, Kans., 163 miles, 12-in.; Paola to St. Louis, 137 miles, 10-in.; St. Louis to Chicago, 198 miles, 8-in.

The loops are scheduled for completion November 1.

National Cooperative Plans New Pumping Installations

McPHERSON, Kans.—National Cooperative Refinery Association, McPherson, is planning installation of pumping units at four midwestern locations.

Three installations will consist of 300-hp. pumping facilities to be completed by January. One of these will be a new station located at East Abilene, Kans. At the existing station

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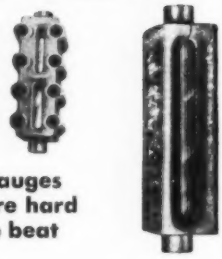

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near Blue Rapids, Kans., 300-hp. pumping facilities are to be added. A new station at Tecumseh, Neb., will also have 300-hp. pumping facilities.

Construction work is under way on the installation of a 100-hp. unit at the existing Council Bluffs, Iowa, station where work is due to be completed in July.

Texas Eastern Contracts 30-In. Lines in Tennessee

SHREVEPORT. — Texas Eastern Transmission Corp. has let contract for construction of 76 miles of 30-in. pipe line from the Tennessee River to a point near Columbia, Tenn., to Eastern Pipe Line Contractors, Dallas.

Contract for construction of 74 miles of 30-in. pipe line from near Columbia to the south side of the Cumberland River in northern Tennessee was awarded to H. B. Zachry Co., San Antonio.

Pipe-Line Briefs

Iowa - Illinois Gas & Electric Co., Davenport, Iowa, has filed application with the Federal Power Commission to construct a 41-mile, 10-in. natural-gas pipe line from Cedar Rapids, Iowa, south to a connection in Washington County with the main line of Natural Gas Pipeline Co. of America. The $1,000,000 line would parallel an existing feeder line and help meet increased demands in the Iowa City-Cedar Rapids area.

Amere Gas Utilities Co., Charleston, W. Va., has asked the Federal Power Commission for authority to build about 35 miles of lines in West Virginia to handle increased demands by present customers for more gas. The proposed project is estimated to cost about $800,000.

Pacific Gas & Electric Co., San Francisco, has made application with the Federal Power Commission to build a 44-mile, 8⅝-in. gas line from a junction with the company's existing line south of Salinas to King City, Calif. The company also asked for certification of the existing 31-mile line terminating south of Salinas to handle out-of-state gas if necessary.

Wyco Pipe Line Co. is increasing the capacity of its products pipe-line system by building a new pump station and adding more pumping equipment at three existing stations. The Wyco system extends from Casper, Wyo., to Colorado.

Atlantic Seaboard Corp. is installing 3,520 hp. in compressor facilities at Files Creek station on the 26-in. line from West Virginia to the Baltimore area. The installation, contracted by J. F. Pritchard & Co., is scheduled for completion November 1.

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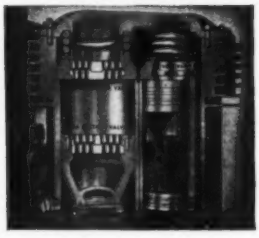

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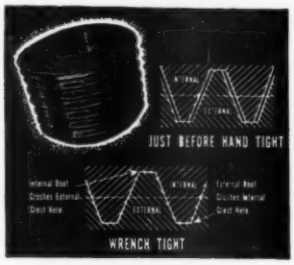

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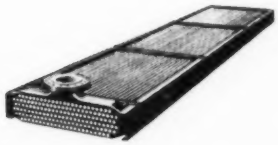

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Pipe-Line Construction

FOLLOWING is a tabulation of pipe-line projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Alberta-Vancouver Oil Pipe Line Co. (Brokaw, Dixon, McKee).—972 miles, 16-in., proposed, Edmonton via Pincher Creek, Alta., Idaho and Washington states to Vancouver, B. C.

General Petroleum Corp.—42 miles, 8-in., under way, San Ardo to Estero Bay, Calif.; Bechtel Corp.; San Miguel, field office; J. S. Connell and George Anderson, superintendents.

Phillips Pipe Line Co.—Authorized, Midland, Glasscock, Reagan, and Upton counties.

Platte Pipe Line Co.—1,075 miles, 16-20-in., contracted, Worland, Wyo., to Wood River refining area in Illinois. Contracted as follows: 552 miles, Chatham, Wyo., to Holdredge, Neb., R. H. Fulton & Co., (Sections 1, 2, 3, and 4—section 1, 126 mi., of 16-in.—remainder 20-in.); 142 miles, 20-in., near Marysville, Kans., to Holdredge, Nebr., Bishop & Lock. H. LaQuey, spreadman, Section 5); to begin May 1951; 100 miles 20-in., northern edge of Kansas, Rumsey Brothers, (Section 6).

Platte Pipe Line Co.—(Section 7) 274 miles, 20-in., under way, Missouri River to Salisbury; field office, Carrollton, Mo.; O. P. Hiner, spreadman. (Section 8) Salisbury to Mississippi River; field office, Moberly, Mo.; B. C. Hall, spreadman. O. R. Burden, contractor.

Progress Co.—900 miles, 20-in., proposed, Permian basin, West Texas to California.

Service Pipe Line Co.—130 miles, 8-10-in., planned, Old Glory field to Bowie, Tex.

Sinclair Pipe Line Co.—700 miles, 22-in., planned; Drumright, Okla., to Chicago.

Texas-New Mexico Pipe Line Co.—75 miles, 8-in., planned, Midland to Germania pool; Midland to Scarborough and Sweetie Peck area; and Crane station to McElroy area, West Texas.

Texas-New Mexico Pipe Line Co.—55 miles, 8-in., planned, Eunice to Covington and Saunders area, New Mexico.

Texas Pipe Line Co.—56 miles, 12¾-in., Chico to Wichita Falls, Tex.; R. H. Fulton & Co., contractor; M. L. Boyd, spreadman, Henrietta, Tex.

Trans-Mountain Oil Pipeline Co. (Sponsored by Bechtel Corp.)—715 miles, under way by July 1951, Edmonton, Alta., via Yellowhead Pass to Vancouver, B. C.

West Texas Gulf Pipe Line Co.—450 miles, 26-in., authorized, Colorado City to Wortham, Tex., 26-in.; Wortham to Sour Lake, Tex., 24-in.

West Texas Gulf Pipe Line Co.—18-in., authorized, Wortham to Longview, Tex.

Products Pipe Lines

Bell Oil & Oil Co.—150 miles, 6-in., planned, Ardmore to Drumright, Okla.

Buckeye Pipe Line Co.—430 miles, 14-in., proposed, Linden, N. J., to Allentown, Pa., Junction; Chelsea, Pa., via Allentown Junction to Auburn, Rochester, Syracuse and Oswego, N. Y. Start 1952; finish 1953.

Great Lakes Pipe Line Co.—355 miles, 12-in., authorized, Kansas City through Omaha and Sioux City Iowa, to Sioux Falls, S. D.

Great Lakes Pipe Line Co.—119 miles, 8-in.; planned; Des Moines to Iowa City.

Plantation Pipe Line Co.—707 miles, 14 and 18-in., under way, Baton Rouge to Charlotte, N. C., 275 miles, 14-in., under way, Bremen to Charlotte, N. C.; 432 miles, 18-in., under way, Baton Rouge to Bremen, Ga.; 220 miles, 18-in., Baton Rouge to Mississippi-Alabama state line; Williams Brothers Co. David R. Williams, Jr., project manager. Spreads as follows: Carrollton, Ga., Thelma Davis, spreadman; Prentiss, Miss., O. R. Mitchell, spreadman; Columbiana, Ala., O. L. Martin, spreadman; Meridian, Miss., A. T. Maxwell, spreadman; Shamblee, Ga., R. J. Hartz, spreadman; Talledega, Ala., T. E. Davis, spreadman.

Progress Co.—900 miles, 10-in., proposed, California to West Texas.

Pure Transportation Co.—100 miles, 6-in., under way, Heath to Dayton, Ohio; Wabash Construction Co.

Salt Lake Pipe Line Co.—Proposed, Pasco, Wash., to Puget Sound.

Standard Oil Co. (Ind.).—50 miles, 8-in., under way, north of Sugar Creek, Mo., refinery; Lawhon Construction Co., Southern Mill & Mfg. Co., contractors.

Standard Oil Co. (Ind.).—144 miles, 8-in., under way by early fall, Neodesha, Kans., to Sugar Creek, Mo.

Texas Pipe Line Co.—56 miles, 10 in., under way, Lawrenceville, Ill., to Mt. Vernon, Ind.; O. R. Burden Construction Corp., contractor; Floyd Lewis, spreadman; Mt. Vernon, Ind., field office. Completed 6-30.

Triangle Pipe Line Co.—100 miles, 10-in. planned, Eldorado, Ark., to point on Mississippi River.

Tuscarora Oil Co., Ltd.—26 miles, 10-in., under way, Barneytown Scraper Trap to East Freedom, Pa.; Pipe Line Construction & Drilling Co.

Natural-Gas Pipe Lines

Algonquin Gas Transmission Co. — 276 miles, proposed, Greenwich, Conn., to Boston area; 462 miles, proposed, laterals-New England area.

Amere Gas Utilities Co.—11 miles, 8-in., authorized KA-5 loop, Priceton and Athens, W. Va. Completion date December 1951.

Associated Natural Gas Co.—88 miles, planned, Missouri.

Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Central Kentucky Natural Gas Co.—12 miles, 20-in., line E loop, Means to Foster, Ky. Completion date October 1951.

Central Kentucky Natural Gas Co.—15 miles, 20-in., Cold Spring, Ky., to Anderson's Ferry, Ohio. Completion date December 1951.

Cities of Booneville and Baldwin, Miss.—96 miles, ¾ and 6-in., under way, Booneville and Baldwin, Miss.; M. L. Hulcher Co., Inc., contractor, Sam Carnahan, spreadman Completion date November 1, 1951.

Cities Service Gas Co.—29 miles, 16-in., under way, Hesston to Wichita, Kans.; Knupp Const. Co.; Newton, Kans., field office, Cliff Harris, spreadman. Completed 6-30.

Cities Service Gas Co.—66 miles, 6-7-8-10-in., under way, takeup Hutchinson to Wichita, Kans.; Knupp Const. Co.; Newton, Kans., field office, Cliff Harris, spreadman.

City of Alabama.—84 miles, 2 to 8-in., under way, Alabama; Modern Welding Co., Inc., contractor, D. D. Foreman, spreadman Completion date October 1951.

Coast Counties Gas & Electric Co.—40 miles, 3, 4, and 8-in., planned, Coast and Valley region, California.

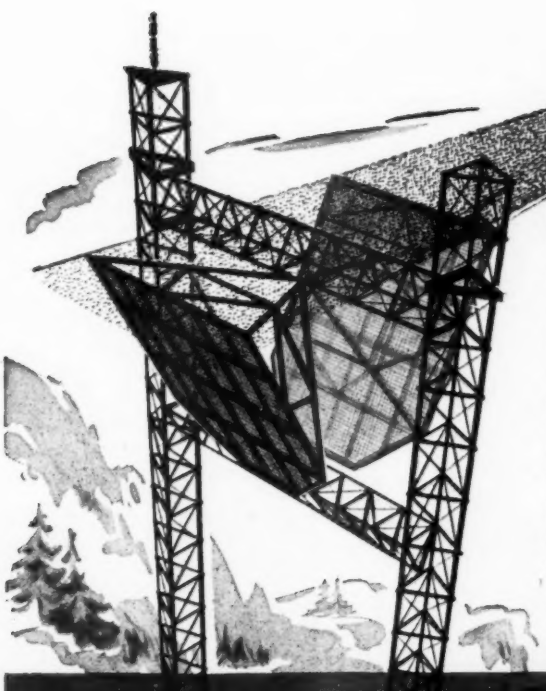
Colorado Interstate Gas Co.—215 miles, 20-in., planned, Texas Panhandle to Colorado.

Commonwealth Natural Gas Corp. — 537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

East Tennessee Natural Gas Co.—172 miles, 22-in., proposed, Greenbrier to Oak Ridge, Tenn.

Egyptian Natural Gas Co.—80 miles, 6-8-in., authorized, Norris City to Salem-Centralia, Ill., area.

El Paso Natural Gas Co.—122.9 miles, 30-



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CROSE

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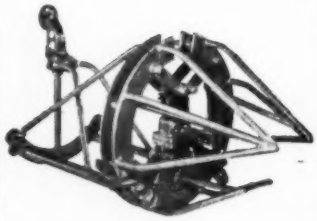

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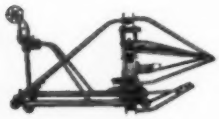
Crose Internal Lineup Clamps are available in manual, electric and hydraulic models for pipe sizes ranging from 12" to 36". Crose Internal Lineup Clamps have been proven in world-wide field operations.



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in., proposed, looping along main line in Texas, New Mexico, Arizona.

El Paso Natural Gas Co.—470 miles, 24-in. under way, San Juan basin, New Mexico to Franconia, Ariz.

Grand Valley Pipe Line Co.—105 miles, 8-10-in., planned, Piceance Creek field to Rifle on to Grand Junction, Colo.

Gulf Michigan Transmission Corp. — 680 miles, 30-in., proposed, Perryville, La., across Arkansas, Missouri, and Illinois to terminus near St. John, Ind.

Hope Natural Gas Co.—32 miles, proposed Fairmont to Terra Alta, W. Va.

Hugoton Production Co.—40 miles, 20 to 4-in., under way, near Ulysses, Kans., gathering system. Reese Bros. Const. Co., contractor, Hugoton, Kans., field office, Paul G. Reese, spreadman.

Humble Oil & Refining Co.—42 miles, 10 in., under way, Anahuac Gasoline Plant near Anahuac, Tex., to Gulf States Utilities plant near Beaumont, Tex.; Houston Contracting Co.; Winnie, Tex., field office; J. A. Cantrell, superintendent.

Kansas - Nebraska Natural Gas Co.—65 miles, 2-8-in., planned, Big Springs field to Ogallala, Neb., and to Ovid, Colo.

Kansas - Nebraska Natural Gas Co.—60 miles, 8-10-12-in., under way, Grand Island to Albion, Neb.; 40 miles, 6-in., under way, Albion to Norfolk, Neb.; 26 miles, 6-in., under way, Albion to Neligh, Neb. Jayhawk Const. Co., Inc., contractor, T. L. Hickerson, spreadman.

Kansas-Nebraska Natural Gas Co., Inc.—22 miles, 12-in., planned, Holcomb to Scott City, Kans.; 12 miles, 12-in., planned, Blakeeney to Palco, Kans.; 34 miles, 12-in., planned, Palco to Phillipsburg, Kans.; 10 miles, 12-in., planned, Alma to Holdredge, Neb. (replacement lines). Neb., 39 miles, 4 and 6-in., planned, Neligh to O'Neill, Neb. 54 miles, 4 and 6-in., planned, Neligh to Hartington, Neb. (extension).

Manufacturers Light & Heat Co.—50 miles contracted, near Pittsburgh, Pa.; 75 miles, near Bradford, Pa.; Britton Contracting Co., contractor.

Michigan Consolidated Gas Co.—180 miles, 24-in., planned, Austin, Mich., to Detroit.

Mississippi River Fuel Corp.—98 miles, 16 and 18-in., proposed, feeder line from Lincoln Parish, La., to Waskom field, Harrison County, Texas.

Mississippi River Fuel Corp. — 40 miles, 8-in., authorized, Dubach to Perryville, La.

National Utilities Co. of Michigan.—76.7 miles, 20-in., proposed, South Central Michigan. (22 miles from near Marshall south to Coldwater; 20 miles east to Hillsdale; 12 miles southwest to Sturgis; 5 miles from Hillsdale to Jonesville and 6 miles west to Union City.)

Nevada Natural Gas Pipe Line Co.—114 miles, proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—50 miles, planned. Summers or Monroe counties, W. Va., to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—39 miles, 20-in., authorized, Potter County, Pennsylvania, to Livingston and Monroe counties, New York.

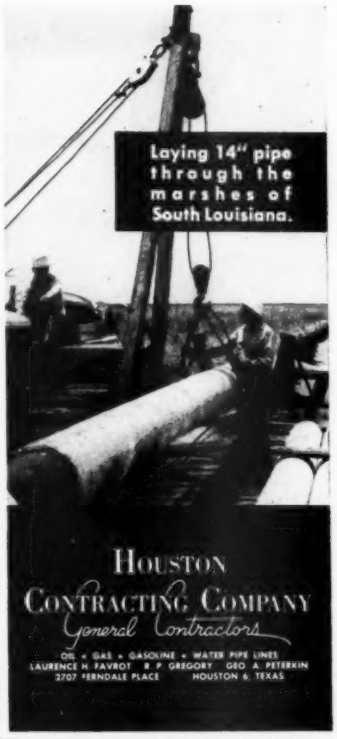
New York State Natural Gas Corp.—36 miles, 20-in., authorized, New Kensington to South Bend, Pa.

New York State Natural Gas Corp.—51 miles, 20-in., authorized, New Kensington, Pa., to Ohio line.

New York State Natural Gas Corp. — 27 miles, 16-in. authorized, looping in Greene and Westmoreland counties.

New York State Natural Gas Corp.—70 miles, 20-in., planned, North Oakford, Pa., to Ohio state line.

New York State Natural Gas Corp.—92 miles, 20-in., under way, Murrysville, Pa., to Petersburg, Ohio; 37 miles, 20-in., under way by May, Boome storage field to Ithaca, N. Y. Field office, Lawrenceville, Pa. Completion date October 1951; 23 miles, 20-in., contracted, state line station to Angelica, N. Y. Office, Wellsville, N. Y. Completion date October 1951; 82½ miles, 20-in., under way by May, Utica to Ithaca, N. Y. Field office, Clinton, N. Y., Leman Creech, supt.; 85 miles, 16-in., under way by September, Utica to Albany, N. Y.; Williams-Austin Co., contractor, Ed Peters, over-all general supt.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New York State Natural Gas Co.—77 miles, 20-in., authorized, South Bend storage area to Ohio-Pennsylvania state line.

New York State Natural Gas Co.—65 miles, 26-in., authorized, Ohio-Pennsylvania state line northwesterly to Summit County, Ohio.

Niagara Mohawk Power Corp.—40 miles, 10-12-16-in., under way by April 1, lateral lines at Utica, N. Y.; 55 miles, 10-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor, Howard Bauer, supt.

Northeastern Gas Transmission Co.—511 miles 20-24-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

Northern Natural Gas Co.—370 miles, 4-26-in., authorized, gathering lines in Hugoton field.

Northern Natural Gas Co.—217 miles, 26-in., under way, Palmyra, Neb., to Skellyville, Tex. G. G. Griffis Const. Co., contractor; field office, Beatrice, Neb.; G. L. Mims, superintendent; E. G. Grisham, spreadman.

Northern Natural Gas Co.—210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

Northern Indiana Fuel & Light Co.—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—22 miles, 16-in. authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

Ohio Fuel Gas Co.—74 miles, 3 to 20-in., authorized, Hocking, Knox, and Ashland counties, Ohio.

Ohio Fuel Gas Co.—47 miles, 20-in., authorized, Benton Township, Hocking County, to Columbus, Ohio.

Ohio Fuel Gas Co.—61 miles, proposed, northern and southwestern Ohio.

Oklahoma Natural Gas Co.—40 miles, 16-in., planned, Ninnekah, Okla., to County Line, Okla.; Trojan Construction Co., contractor.

Pacific Gas & Electric Co.—47 miles, 8-in., authorized, Salina to Kilig City, Calif.

Pacific Gas and Electric Co.—141 miles, 34-in., proposed, parallel sections along Topock-Milpitas line.

Pacific Northwest Pipe Line Co.—400 miles, 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Gas Pipe Line Corp.—2,175 miles, planned, Wharton County, Texas, via Oklahoma, Kansas, Fort Collins, Colo., to Portland, Ore., Tacoma and Seattle, Wash.

Panhandle Eastern Pipe Line Co.—174 miles, 30 and 26-in., contracted, Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; Anderson Bros.; 22 miles, 30-in., looping in Tuscola, Ill.; 45 miles, 30-in., looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Pennsylvania Gas Co.—52 miles, 12-in., between Warren and Erie, Pa.

Phillips Petroleum Co.—118 miles, 3-22-in., under way, Sherman and Hansford counties, Texas gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas Tex.

Piedmont Natural Gas Co.—28 miles, 8-in., proposed, North Carolina—laterals from Transcontinental gas system.

Potomac Gas Co.—18 miles, 16-in., Dranesville to Arlington, Va.

Prince George's Gas Corp.—20 miles, 22-in., authorized, between Chillum and Rockville, Md.

Public Service Co. of Northern Illinois.—25 miles, 10-in., under way, Matteson to Kankakee, Ill. Contracting & Material Co., Mantero, Ill., field office; Art Frye, spreadman. Completion date 6-10-51.

South Central Alabama Natural Gas Co. Inc.—150 miles, proposed, central Alabama

South Georgia Natural Gas Co.—248 miles planned.

Southern Natural Gas Co.—120 miles, 16-in.; under way; Mitchell Village, Ala., to Bolingbroke, Ga.; Associated Pipe Line Contractors, Inc., contractor; Columbus, Ga. field office; Lacy Walker, spreadman.

Southern Natural Gas Co.—138 miles, 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta Ga.

Southern Natural Gas Co.—169 miles, proposed loops, Ouachita Parish, Louisiana, to Augusta, Ga.; 20 miles in Ouachita Parish; 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 108 miles, 14-in., Bass Junction to Augusta, Ga.

Southwest Gas Corp., Ltd.—26 miles, proposed, from P. G. & E. line to Victorville, Calif.

Sunray Oil Corp.—133 miles, 3-30-in., system for Snyder gasoline plant, Vaughn & Taylor Construction Co., contractor. D. D Vaughn, spreadman.

Tennessee Gas Transmission Co.—982 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

Tennessee Gas Transmission Co.—438 miles, planned, looping on Buffalo and New England extensions.

Tennessee Gas Transmission Co. and Northeastern Gas Transmission Co.—175 miles, 24-in., under way, Albany, N. Y., near Wilmington (Boston area), Mass. Oklahoma Contracting Co., contractor, Springfield, Mass., headquarters, Paul R. Halbert, manager, H. A. Wylie, spreadman at Pittsfield, Mass., Aldress Kilgore, spreadman at Westfield, Mass. L. B. Rea, spreadman.

Tennessee Gas Transmission Co.—304 miles, 24-in., proposed, between Mercer, Pa., and Utica, N. Y.; 328 miles, proposed, loops; 200 miles, proposed, miscellaneous lateral lines.

Tennessee Gas Transmission Co.—158 miles, 30-in., under way, vicinity of Jones, La., on the north to near Cypress, Tex., on

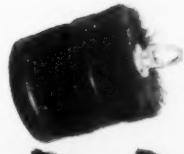
THE PIG WITH THE POKE — CLEANS PIPE LINES

— THE VERY LATEST —

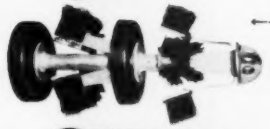
Williamson Pipe Line Pigs*

FOR CLEANING

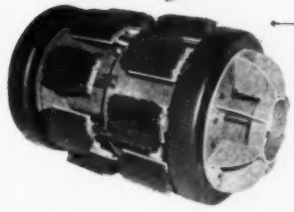
Natural Gas Pipe Lines



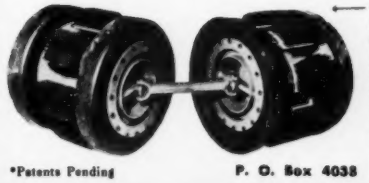
← 4" Size—TYPE JRN—2" to 4" sizes. Will pass 1½R-90° Bends. No valves other than full diameter thru-port valves. Use TYPE SCN-51 for 6" Size.



← 8" Size — TYPE WC-11 — 8" to 14". Will traverse 6 foot radius field bends, full diameter side openings at 45°. SPRINGS COMPENSATE for BRUSH WEAR.



← 20" Size—TYPE GP-2—16" to 30". 200-LB. SPRING Forces the Brushes against pipe wall —COMPENSATING for WEAR. Will traverse round-opening gate valves. SPRINGS and BRUSHES are identical and interchangeable for all types and sizes of GP PIGS.



← 24" Size — GP-3 — 18" to 30" Sizes will pass 1½R-90° Bends. SPRINGS COMPENSATE for BRUSH WEAR, ASSURING Full section cleaning efficiency. GP-3 consists of two Type GP-1 Pigs. — Each Unit may be used as individual pig.

*Patents Pending

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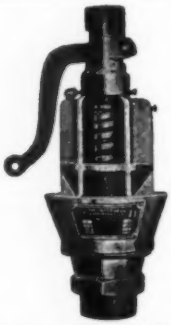

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the south; Houston Contracting Co. Four spreads located as follows: North end work at Bastrop, Tex., W. H. Hayes and M. L. Thompson, superintendents; center section at Natchitoches, La., E. C. Norris and R. E. Thornton, superintendents; south end at Conroe, Tex., F. A. Silar, superintendent.

Tennessee Gas Transmission Co.—64 miles, 26 and 30-in., loops, contracted, South Texas, Oklahoma Contracting Co., contractor, field office, Falfurrias, Tex., Panama Shiflett, superintendent.

Tennessee Gas Transmission Co.—156 miles, 24-in., under way, Hamburg to Onondaga-Madison County line, N. Y.; H. C. Price; Auburn and Warsaw, N. Y., field offices, G. A. Reutzel and R. K. Shivel, spreadmen.

Tennessee Gas Transmission Co.—120 miles, 24-in., under way, Hamburg to Hudson River; Bechtel Constructors, Inc.; Richfield Springs, N. Y., project office, R. L. Bowman and G. H. Homann, superintendents.

Tennessee Gas Transmission Corp.—419 miles, 26-30-in., authorized, loop line along presently authorized system.

Texas Eastern Transmission Corp.—791 miles, 30-in., planned, Kosciusko, Miss., to Connellsville, Pa.

Texas Eastern Transmission Corp.—36 miles, 20-in., under way by 6-1-51, Connellsville, Penna., to Oakland Storage area; Mahoney Contracting Co.; Henry Mogg, superintendent.

Texas Eastern Transmission Corp.—163 miles, 30-in., under way, Kosciusko, Miss., to Florence, Ala.; Williams Bros.-Davis Co.; Kosciusko, Miss., field office, G. R. Hamilton, spreadman.

Texas Gas Transmission Corp.—35 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

Texas Gas Transmission Corp.—189 miles, 26-in., proposed, Acadia Parish to connection with existing facilities in Morehouse Parish.

Texas Gas Transmission Corp.—195 miles, 26-in., proposed, Gulf Coast region to southwestern Louisiana.

Texas Gas Transmission Corp.—425 miles, 26-in., proposed, looping from Bastrop, La., to Hardinsburg, Ky.

Texas Gas Transmission Corp.—580 miles, 26-in., proposed, Louisiana and Kentucky.

Texas-Illinois Natural Gas Pipeline Co.—1,300 miles 30-in., under way, Corpus Christi area to Joliet, Ill.

Texas Illinois Natural Gas Pipe Line Corp. 58 miles, 20-in., under way, Joliet, Ill., to Volo Meter Station, Ray L. Smith & Son, Inc., contractor; field office, Aurora, Ill.; R. M. Jones, spreadman.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Mississippi River to Effingham, Ill.; Midwestern Constructors, Inc., contractor of Schedule 11; M. F. Wilhite, superintendent; field office Du Quoin, Ill.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Effingham to Sibley, Ill., Midwestern Constructors, Inc., contractor of Schedule 12. Monticello, Ill., field office, Cliff Simmons, superintendent.

Texas-Illinois Natural Gas Pipeline Co.—92 miles, 30-in., under way, Sibley to Joliet, Ill.; Midwestern Constructors, Inc., contractor of Schedule 13. Morris, Ill., field office, Denver Franklin, superintendent.

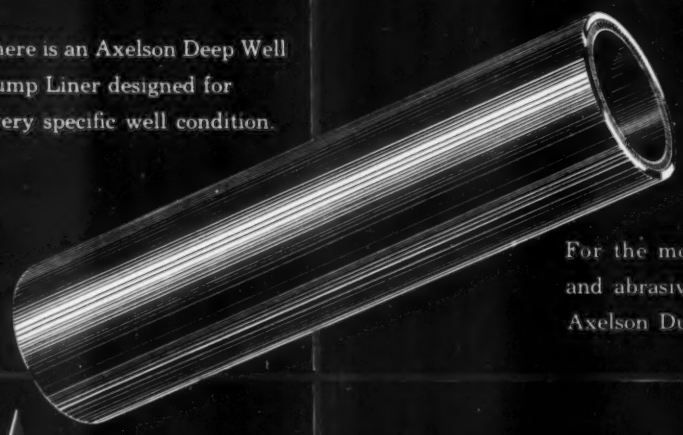
Texas-Illinois Gas Pipe Line Corp.—400 miles, 30-in., contracted, Arkansas and Missouri; Bechtel Corp. A. M. Berlander, general superintendent; field offices at Newport, Ark., J. E. Richardson; Texarkana, Ark., V. L. Williams; Popular Bluff, Mo., A. M. Berlander.

Texas-Illinois Gas Pipe Line Corp.—200 miles, 30-in., under way; Trinity River to Texarkana; H. C. Price, contractor. C. E. Shivel, spreadman at Carthage; C. R. Ice, spreadman at Nacogdoches.

Transcontinental Gas Pipe Line Corp.—35 miles, 24-in., authorized, Paterson lateral to Greenwich, Conn.

Trunkline Gas Co.—1,775 miles, 10

There is an Axelson Deep Well Pump Liner designed for every specific well condition.



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26-in., under way, includes 740-mile, 26-in. Lake Charles, La., to Tuscola Station of Panhandle Eastern Pipe Line Co., and 1,036 miles, 10-24-in., Lake Charles, La., to McAllen, Tex., completion due October 1, 1952.

Trunkline Gas Co.—50 miles, 26-in., contracted, Longville to northeast vicinity of Hineston, La.; 126 miles, 26-in., contracted Epps to Hineston, La.; 42 miles, 16-20-in., under way, Lake Arthur, Longville to point north of Iowa, La., (Section 1, lateral line); 23 miles, 20-in., under way, Lake Arthur, La., to Lacassine, La.; Houston Contracting Co., contractor.

Trunkline Gas Co.—176 miles, 26-in., under way, Darnell, La., to Longville, La.; Houston Contracting Co., contractor of Section A, main line. E. C. Norris, Ohio, La., spreadman. W. H. Hayes, spreadman, De Ridder, La.

Trunkline Gas Co.—180 miles, 26-in., contracted, Darnell, La., to Senatobia, Miss.; Anderson Bros. Corp., contractor, Section B, main line.

Trunkline Gas Co.—184 miles, 26-in., under way, Senatobia, Miss., to Paducah, Ky.; R. H. Fulton & Co., contractor of Section C, main line. Clark Williams, Memphis, Tenn., spreadman.

Trunkline Gas Co.—186 miles, 26-in., contracted, Joppa to Tuscola, Ill.; Mahoney Contracting Co., contractor of Section D main line. Flora and Marion, Ill., field offices, Henry Mogg and Barney Finnerty, spreadmen.

Trunkline Gas Co.—262 miles, 20-in., contracted, McAllen to Altair, Tex.; R. H. Fulton & Co., contractor of Section E and F, lateral lines.

Trunkline Gas Co.—217 miles, 24-in., contracted, Longville, La., to Altair, Tex.; Anderson Bros. Corp., contractor of Sections G and H, lateral line.

Union Gas & Electric Co.—33 miles, 8-in., contracted, near Bloomington, Ill.; O. R. Burden Contracting Co.

United Gas Pipe Line Co.—50 miles, 16-in., authorized, Baldwin County, Alabama, southeasterly to Escambia County, Florida.

United Gas Pipe Line Co.—93 miles, 6 to 16-in., under way, fields in Plaquemines Parish, Louisiana, to near New Orleans. H. C. Price, J. Ray McDermott, and Brown & Root, contractors.

United Gas Pipe Line Co.—100 miles, 20-24-26-in., contracted, Near Houma to Franklin, La.; Associated Pipe Line Contractors, Inc.

United Gas Pipe Line Corp.—510 miles, 24-26-30-in., contracted, Agua Dulce, Tex., to Monroe, La.; 233 miles, 20-24-26-30-in., from Pure Oil Co.'s offshore platform Block 32 Eugene Island area to Jackson, Miss., comp. sta.; 60 miles, 12-16-20-in., from Lafayette comp. sta. and Weeks Island field to Franklin, La., to connect with above mentioned 30-in.; 59 miles, 30-in., Jackson comp. sta., Miss., to Texas Eastern Trans. Corp.; 124 miles, Sterlington comp. sta. near Monroe, La., to Jackson comp. sta., Miss.; 23 miles, 8-12-16-in., South Louisiana facilities; all contracted by Gulf Southern Contractors, a joint venture including Texas Louisiana Contractors; Oklahoma Contracting Co.; J. Ray McDermott and Morrison-Knudson. Inspection by Brown & Root, Inc.

United Gas Pipe Line Co.—30 miles, 30-in., under way, Napoleonville to Gonzales, La. Texas-Louisiana Contractors; field office, Donaldsonville, La.; Red Tatom, spreadman. Completion date 7-10-51.

United Gas Pipe Line Co.—30-in., contracted, Gonzales, La., to Koscuisko, Miss. Texas-Louisiana Contractors. Completion date 11-51.

United Gas Pipe Line Co.—24-in., contracted, Baxterville, La., to McComb; Texas-Louisiana Contractors. Completion date 11-51.

U. S. Army Engineers.—190 miles, 6⅝-in., under way, Searsport to Limestone, Me.; Associated Pipe Line Contractors, Inc. Completion date 10-15-51.

Utah Natural Gas Co.—360 miles, 22-in., proposed, San Juan Basin area to Salt Lake Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Westcoast Transmission Co., Ltd.—1,403 miles, 30-in., planned, northern Alberta to Vancouver, B. C., and northern California.

Western Kentucky Gas Co.—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in., planned, Southern Alberta to Duluth, Minn.

York Gas Co. and Corning Glass Co.—30 miles, York, Pa., and Corning, N. Y.; Britton Contracting.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta Pacific Oil Pipe Line Co. (Brokaw, Dixon, McKee).—970 miles, 16-in. proposed, Edmonton south to Kingsgate, B. C., to Washington to Vancouver, B. C.

Basrah Petroleum Co.—72 miles, 12-16-in., under way, Zubair to Fao, Iraq.

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor S.P.A. (Shell).—80 miles, planned, Genoa to Rho, near Milan, Italy.

Direccion General de Yacimientos Petroliferos Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Independent Pipe Line Co.—721 miles, 16-18-22-in., proposed, Edmonton to Vancouver. Spreads as follows: 185 miles of 22-in.; 391 miles, 20-in.; 95 miles, 16-in.; and 30 miles, 18-in.

Iraq Petroleum Co., Ltd.—556 miles, 30-32-in., under way, Kirkuk, Iraq, to Banias, Syria, 1952; Bechtel-Kirkuk, contractor.

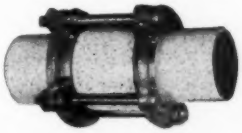
Middle East Pipelines, Ltd.—800 miles, 34-36-in., planned, Iran to a Levantine port.

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

Petroleos Mexicanos.—100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

Shell Caribbean Petroleum Corp.—10 miles, 20-in., under way, Across Lake Maracaibo, Venezuela, S. A. Mahoney Contracting Co.; Angelo Tavernaro, superintendent.

Shell Caribbean Petroleum Co.—165 miles, 30-in., under way; Palmarejo to terminals



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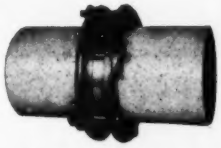

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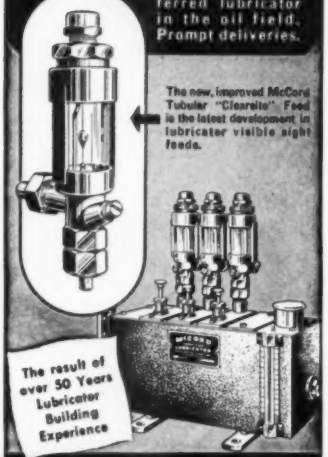

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in the Paraguana Peninsula (Cardon and Las Piedras, Venezuela), 12-51. Land sections contracted by Williams Brothers, de Venezuela, S. A., Charles P. Williams, manager, Marvin E. Jones, superintendent. Water crossings contracted by Mahoney Contracting Co.

Shell Caribbean Petroleum Co.—16 miles, 14-in., under way, Tia Juana to Cabimas (hot oil).

Trans-Mountain Oil Pipe Line Co.—715 miles, proposed, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd contractor. Completion date 1952.

Winnipeg Pipe Line Co., Ltd.—75 miles, 10-in., under way, Gretna to Winnipeg, Manitoba; Sparling-Fowler Co., Ltd.

Foreign Products Pipe Lines—Planned and Under Way

Colombia Ministry of Petroleum.—90 miles, 8-in., planned, Puerto Berrio to La Dorada, Colombia.

Colombia Ministry of Petroleum.—113 miles, 6-in., contracted, Puerto Berrio to Acededo near Medellin, Colombia. Carolina Construction Co.

Colombian Ministry of Petroleum.—75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 4-in., under way, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor.

Estrada de Ferro Santos Jundiai.—32 miles, 10-in., under way, Santos to Sao Paulo, Brazil; Techint, contractor.

Estrada de Ferro Santos a Jundiai.—32 miles, 18-in., under way, Santos to Sao Paulo, Brazil (fuel oil line); Techint, contractor.

Governments of Southern Rhodesia and Portuguese East Africa.—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Imperial Oil Co., Ltd.—10-in., planned, Sarnia to London, Hamilton to Toronto.

Petrocongo (Sub. Cie. Financiere Belge des Petroles, S. A.).—225 miles, considered, Ango-Ango to Leopoldville, Belgian Congo.

Petroleos Mexicanos.—155 miles, 10-in., under way, Minatitlan to Salina Cruz, Mexico.

Societe des Transports Petroliers par Pipe Line.—150 miles, 10-in., under way, Le Havre to Paris, France. Entrepose, contractor.

State of Cundinamarca, Colombia.—120 miles, 6-in., Puerto Salgar, to Bogota, Colombia; Williams Brothers Corp., David Louthen, manager, Bogota.

Trans-Northern Pipe Line Co.—400 miles, proposed, Hamilton, Ont., to Toronto, Ont., to Montreal, Que., Canada.

Foreign Natural-Gas Pipe Lines—Planned and Under Way

Azienda Generale Italiana Petroli.—110 miles, 12-14-16-in., planned, Cortemaggiore to Genoa.

Azienda Generale Italiana Petroli.—110 miles, planned, Cortemaggiore to Bologna.

Azienda General Italiana Petroli.—145 miles, 14-16-in., under way, Cortemaggiore to Torino. Completion date 1951.

Azienda Generale Italiana Petroli.—30 miles, 8-in., under way, Ferrara to Bologna. Completion date, July 1951.

Canadian Delhi Oil Co. (Subsidiary Delhi Oil Co.).—2,132 miles, proposed, Alberta, Toronto, Montreal.

Direccion General del Gas del Estado.—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

Northwest Natural Gas Co.—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Northwestern Utilities, Ltd.—35 miles, 16-in., authorized, Viking to Shonts.

Petroleos Mexicanos.—205 miles, 16-in., considered, Monterrey to Torreon, Mexico.

Petroleos Mexicanos.—260 miles, 20-in., under way, Monterrey to Tampico and Poza Rica, Mexico.

Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.—600 miles, planned, Reynosa, Tamaulipas, to Tampico-Poza Rica, Mexico.

Trans-Canada Pipe Lines, Ltd.—Proposed, Alberta to Toronto and Montreal.

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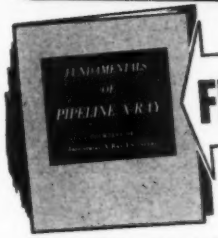

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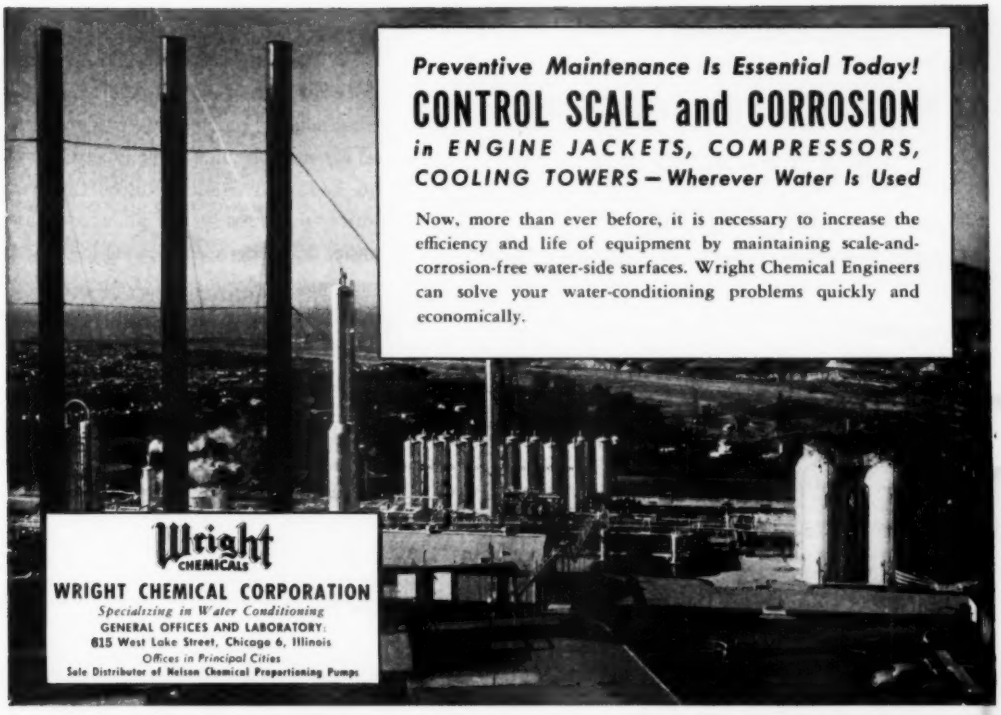

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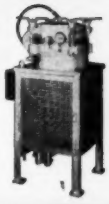

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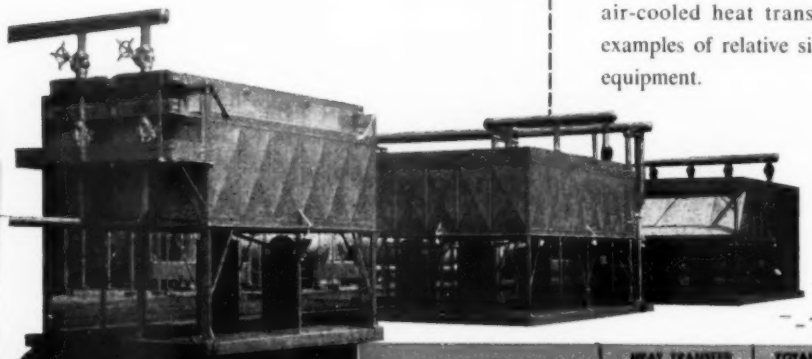
Here are 15 TYPICAL APPLICATIONS for FIN-FAN AIR-COOLED Heat Exchanger Equipment

For many years, Fin-Fan Air-Cooled Heat Exchangers have proved their worth by giving reliable, economical service in many and varied applications. The Fluor Corporation, Ltd., and Griscom-Russell Company, pioneer-partners in the air-cooled heat transfer field, offer the following to show the large variety of practical applications for air-cooled heat transfer equipment and examples of relative size and duty of such equipment.



	SERVICE	HEAT TRANSFER (BTU/HR.)	TOTAL H.P.	GROUND SPACE
GAS COOLING	Natural Gas After-Cooler	13,920,000	80	46' x 25'
	Manufactured Gas Cooler	11,165,000	50	23' x 21'
	Natural Gas After-Cooler	3,400,000	15	11' x 21'
	Natural Gas Inter-Cooler	7,890,000	40	23' x 21'
VAPOR CONDENSING	Reflux Condenser	18,407,000	90	48' x 25'
	Primary Condenser	4,652,000	40	11' x 25'
	Still O.H. Condenser	4,875,000	34	16' x 21'
	Debutanizer Condenser	11,930,000	60	23' x 25'
	Still Reflux Condenser	39,110,000	60	46' x 25'
	Steam Condenser	87,300,000	300	138' x 31'
	Steam Condenser	2,880,000	10	10' x 6'
LIQUID COOLING	Vegetable Oil Cooler	628,000	15	6' x 17'
	Absorption Oil Cooler	14,915,000	100	32' x 17'
	Quenching Oil Cooler	1,665,000	50	23' x 25'
	Amine Solution Cooler	19,300,000	175	38' x 25'
	Stabilized Crude Cooler	125,100,000	700	315' x 25'
	Jacket Water	2,400,000	5.5	16' x 12'
	Jacket Water	28,800,000	100	70' x 24'

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REFINING

Alkylation Comeback

Avgas needs satisfied by reactivated, new plants

ALKYLATION, a process which very nearly became extinct after World War II, is coming back strong.

Since last October, refiners have been issued certificates for 19 alkylation projects under the accelerated-amortization provision. When completed, the projects will add 23,560 bbl. per day of aviation-grade alkylate to national production, at an estimated cost of $35,000,000.

Korean crisis.—The rush to build alkylation facilities follows a postwar period which saw nearly all such operations cease. The octane race brought the first indication of revival 2 years ago. Then came Korea and a temporary shortage of avgas—largely because of inadequate alkylate facilities.

Refiners met this by reactivating standby units. Result: about 50 alkylation units are now operating or operable. Three new ones have been built. Planned originally to provide high-octane blend for motor gasoline, they are being integrated into the avgas program. The Calso plant, shown below, is one of these.

War program.—The World War II alkylation program resulted in the building of 59 alkylation units in this country with a total rated capacity for producing 178,000 bbl. of finished aviation alkylate daily. These plants were built almost wholly with government financial help. Most were government-owned and industry-operated.

The difference between World War II construction and the present program is that this time the new capacity is being financed privately with only the accelerated amortization for incentive. More plants are planned, and the Petroleum Administration for Defense has left the door open for further applications from oil companies for certificates of accelerated amortization for expanding alkylate production.

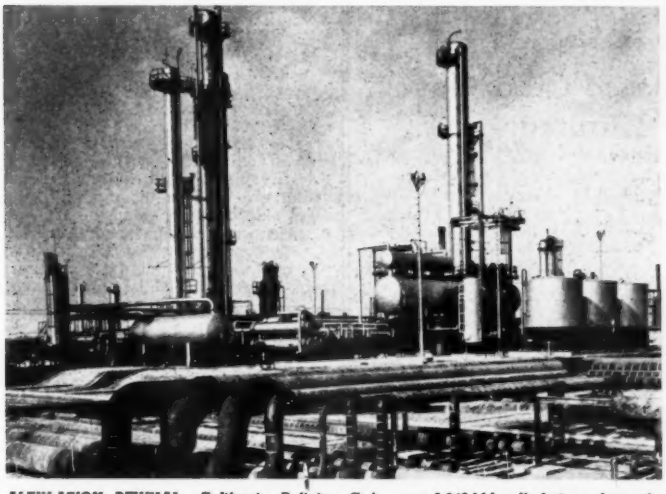
Jersey Standard to Expand Neodesha Refinery Further

NEODESHA, Kans. — Further expansion of the refinery of Standard Oil Co. (Ind.) here by construction of a catalytic cracking unit and an alkylation unit has been announced.

Dr. M. G. Paulus, vice president in charge of manufacturing, said the addition of the new unit would bring processing facilities at Neodesha into balance.

If materials can be obtained on schedule, the company expects to complete this second phase of its expansion program about the end of 1952.

Work is already under way on the



ALKYLATION REVIVAL.—California Refining Co.'s new 2,240-bbl. alkylation plant, the East's first postwar unit, recently placed on stream at Barber refinery, Perth Amboy, N. J. It was originally planned to help meet the "octane challenge" of the high-compression engine, but was modified during construction to include a rerun tower to fractionate alkylate because of increased military requirements for avgas.

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first phase. This involves revamping and additions to the crude distillation, coking, and rerunning units to increase refinery crude capacity from 10,400 to 19,700 bbl. per day. It is scheduled for completion early next year.

Surplus cracking stock produced at the plant during the period between completion of the two steps of the program will be piped to Jersey Standard's Sugar Creek, Mo., refinery for processing in catalytic cracking facilities there.

Bureau of Mines Contracts For New Shale-Oil Retort

DENVER. — The Bureau of Mines has awarded a $333,870 contract for design and construction of a demonstration-scale retort which will employ the new gas-combustion process for continuous extraction of oil from shale.

The retort, to be constructed at Rifle, Colo., by Blaw-Knox Construction Co., Pittsburgh, will have a processing capacity of 150 to 400 tons of oil shale daily.

It will be patterned after a small 6-ton per day pilot plant which has established the gas-combustion process as the most efficient and economical yet tested at Rifle, the bureau said.

Boyd Guthrie, chief of the bureau's oil-shale demonstration plant, said that crude shale oil produced by the retort is expected to compare favorably in production cost with natural petroleum. It will be somewhat inferior in quality, he said, but finished products "of good quality can and will be refined from it."

Preliminary engineering and design work are slated to begin at once, and the retort is expected to be in operation in about a year.

The gas-combustion process is so named because it produces gas obtained from shale and burned in the presence of air, which it uses as a source of heat for retorting. Unlike most other retorting processes, it requires neither water, air nor an elaborate system for condensing the liquid products. A major factor, however, is that investment and operating costs will be substantially lower than those for other processes tested, reducing product costs.

Texas Standard Contracts For New Alkylation Plant

EL PASO, Tex.—Standard Oil Co. of Texas has awarded contract for design and construction of a sulfuric acid-alkylation plant at the refinery here to M. W. Kellogg Co.

The plant, estimated to cost more than $1,000,000, will produce 1,400 bbl. of gasoline per day with an octane rating of approximately 100/130.

It will employ a cascade-type reactor and motor-driven agitators to mix butylene, propylene, and isobutane with the acid. Construction is scheduled to start this fall.

Construction Progressing On New Kanotex Facilities

ARKANSAS CITY, Kans. — Construction is progressing on new facilities at Kanotex Refining Co.'s refinery here which will enlarge crude capacity of the plant from 9,500 to 12,000 bbl. per day.

The expansion program includes construction of a vacuum-feed-preparation unit, a fluid catalytic cracker, additions to and revamping of the gas plant, and an induced-draft, condenser-water cooling tower.

Kanotex expects the facilities to be in operation in June 1952. Refinery Engineering Co., Tulsa, has contract.

Shell Develops New Extreme Pressure Grease for Planes

NEW YORK.—Shell Oil Co. has developed a new extreme-pressure grease that lubricates aircraft gears and actuators satisfactorily at temperatures ranging from —65° F. to 250° F. The grease has been designed to insure fast, smooth action of gears, actuator screws, and other parts of these units where design requires the use of a single grease. The grease has been named Aeroshell Grease 7.

This announcement is neither an offer to sell nor a solicitation of offers to buy any of these securities. The offering is made only by the Prospectus.

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Copies of the Prospectus may be obtained from the undersigned only by persons to whom the undersigned may legally offer these securities under applicable securities laws.

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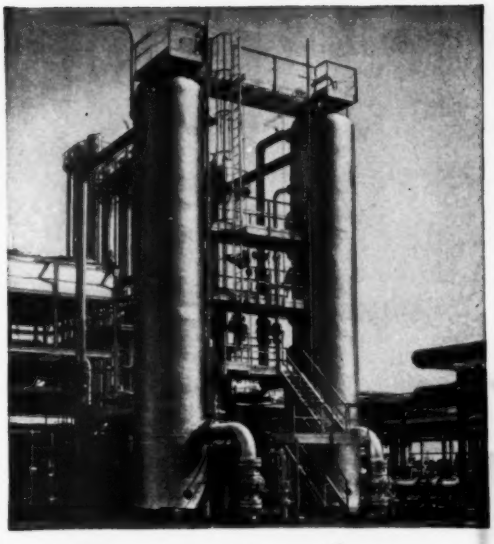

Panoma has found
FLORITE
"very satisfactory"

The Panoma Plant of the Panoma Corporation, near Hooker, Okla., uses Florite in its dehydration towers, which were handling daily at last report, 85 million standard cubic feet of natural gas at a pressure of 675 pounds. They were designed to handle 140 million standard cubic feet at 750 pounds pressure. Gas dehydration is required in preparation for pipeline transmission.

This large modern plant has been in use since November, 1948, and, according to a report of the Panoma management at the end of a year, "has operated very satisfactorily."

Floridin Products, adapted to a wide range of industrial and technical uses, include especially prepared forms of

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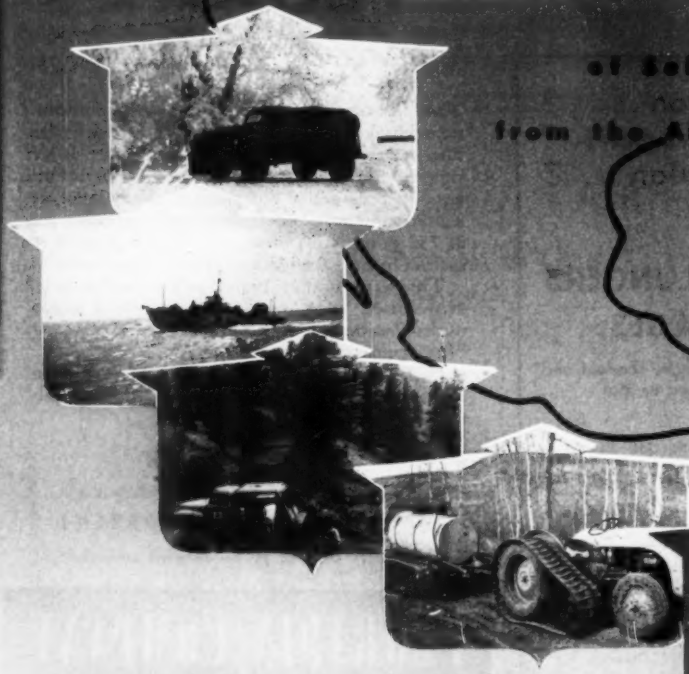

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Exploration and Drilling

Research "Wildcat"

A FEW miles east of Tulsa a rare kind of "wildcat" is nearing completion.

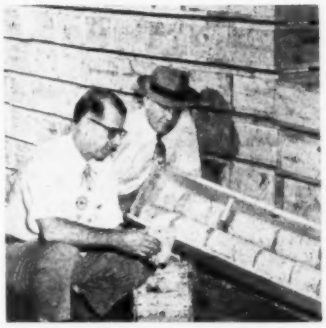
This unusual wildcat was cored continuously from about 40 ft. to total depth at 1,335 ft. It was surveyed with more different kinds of logging devices than any similar hole. Yet, strangely, its operator, Well Surveys, Inc., had no more than an academic interest in whether or not oil or gas in commercial quantities was encountered. *(See pictures on page 44).*

This wildcat, located on the grounds of Well Surveys' east laboratory, is to become a permanent test hole for all kinds of logging devices that can be used in cased holes. In the immediate future the hole will be used primarily for the purpose of evaluating radioactivity logging processes.

The well was dug with emphasis on recovering as complete a section as possible so that extremely detailed correlations between various kinds of traces and rock types can be made. Diamond-coring equipment has successfully cut an essentially continuous 4¾-in. core which has been carefully labeled and stored. Most of the rock penetrated has been shale, but some limestones and sandy shales have been cut. The Mississippian was topped at 1,290 ft., and in order to get below the weathered zone, the hole was carried down an additional 45 ft.

Several kinds of electric logs were run in the bore hole to give useful information to supplement that obtainable from cores, which at best are but small samples of the volume of rock penetrated. Besides running conventional radioactivity logs, several experimental logging devices belonging to Well Surveys and other companies were tested prior to running casing to bottom.

In addition to having a complete section of cores and various electric logs from which desired information can be checked as the need for it arises, this test hole has the added advantage of being handy to Well Surveys' laboratories, where instruments are developed and made. This means that to investigate new curves the company will no longer be dependent on other companies' wells, which are usually distant, offer only limited time on location, and no repeat runs.



W. G. Green and C. E. Duller discuss their wildcat's cores.

Probably the most important aim of near-future tests will be an attempt to extend quantitative interpretation methods (porosity determinations) of the neutron curve, now used with such success in limestone, into sandstone and oil-bearing shales.

After the drilling rig moves off this hole, a pit about 20 ft. deep and 6 ft. across will be dug nearby. Large blocks of rock from fresh exposures with a 6-in. hole drilled through them will be lowered into the pit. Fractured rocks can be sandwiched between dense blocks and the entire pit flooded with various fluids (oil, fresh water, or salt water) for experimental runs. Out of such tests may come methods for determining fluid saturation and for picking oil-water contacts from radioactivity curves under various bore-hole conditions. Also, certain geometric calculations regarding the depth of penetration of the neutron log can be verified.

An experimental well of this nature is a long ways from being "oily," but it is just such research that the oil industry needs if it is to continue in the enviable position that it enjoys today. The time may not be far away when methods of curve interpretation developed from work in Well Surveys' hole will be recognized as essential in the search for oil.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

SOUTHWEST TEXAS.—What apparently is an important discovery is being completed on the east flank of Dilworth salt dome in McMullen County. H. R. Smith et al., 1 Martin estate, Nancy Wright Survey 18, A-491, flowed 150 bbl. of oil through perforations at 8,355-64 ft. and 8,378-85 ft. This is believed to be the first lime production on any South Texas salt dome. Dilworth was discovered the latter part of 1950, and is 50 miles from any known salt dome.

WEST TEXAS.—Spraberry tests showing oil, and located 1 mile or more from present production, included Sohio 1-A Hutt, west of Driver field, which had 2,500 ft. of oil in the hole. Sohio 1-B Hutt, north of the 1-A, had 100 ft. of oil in the hole after drilling 6 ft. into the Spraberry at 7,230 ft. Sohio 1 Boone swabbed 63 bbl. of oil in 24 hours. In Crockett County, Continental 1-A Shannon had apparently established Ellenburger production between Todd Deep and Midway Lane fields.

NORTH TEXAS.—Cities Service 1-140 Flat Top, Stonewall County Swastika sand discovery, completed for 330 bbl. of oil a day through ¼-in. choke.

ROCKY MOUNTAIN AREA.—New wildcat drilling is planned for the Uintah Basin of northeastern Utah, as Continental Oil Co., Carter Oil Co., Sun Oil Co., and others process new blocks. Carter is preparing to test the Duchesne unit wildcat, where 4,680 ft. of oil and mud was recovered on test prior to the rig burning recently. Plains Exploration Co. recovered water on first tests of its new Logan area wildcat, Logan County, Colorado.

Oklahoma

Red Fork Produces in Pawnee County Wildcat

INITIAL production tests have virtually assured the opening of a new Red Fork sand pool in southwestern Pawnee County. The prospective discovery well, Ashland Oil & Refining Co. 1 Eye Bear, NW NW NW 35-21n-5e, recovered load oil and flowed 64 bbl. of new oil in the first 18 hours, flowing through ½-in. choke. Gas production was at an estimated rate of 1,000,000 cu. ft. per day. Pay zone was topped at 3,204 ft. and drilled to 3,225 ft. Hole is open below 3,221 ft. and casing perforated from 3,219 ft. The area is 5 miles southeast of the town of Pawnee and about 3½ miles northwest of the Maramec pool, nearest production.

Coal Oil & Gas Co.'s prospective oil and deeper pay zone discovery in the East Oconee gas-distillate area, 12 miles east of Coalgate, in Coal County, southeastern Oklahoma, is reported to have flowed at the rate of 20 bbl. of fluid (94 per cent oil) per hour through ⅛-in. choke on a late gage. The report was unverified. Production is believed to be from Oil Creek sand with bottom of the hole at approximately 7,545 ft. and casing at 7,530 ft. Present gas-distillate production in the area is from McLish sand.

Union Producing Co. appears to be opening what may prove a new, deeper producing zone for the Elk City field, in Beckham and Washita counties, at its 1-B W. T. Music, C NW NE 26-10n-21w. In a 4-hour drill-stem test through casing perforations at 11,849-861 ft., operators recovered load oil plus 270 ft. of heavily oil-cut mud and 2,520 ft. of free oil and some very heavily oil-cut mud. The well, located on the south side of the field, was drilled to a total depth of 13,576 ft. It has 7-in. casing to 11,856 ft. and 5½-in. liner to 13,287 ft.

A wildcat located a mile southeast of the South Davenport pool, Lincoln County, flowed an estimated 30 bbl. of oil per hour through chokes while testing Cleveland sand, logged at 2,742-54 ft. It is Keystone Oils and Larsco Drilling Co. 1 Cox, SW SW SE 22-14n-5e. The sand is a new pay zone for the general area. Gravity of the oil is 44°. Gas production was estimated at 248,000 cu. ft. per day.

Lawrence & Bush Production Co. has chalked up a north extension for the Northeast Roady pool, Garvin County, where its 1 C. A. Smith, SW NE NE 36-2n-1w, flowed an average of 4½ bbl. of oil per hour through 12/64-in. choke from Deese sand, opposite which casing is perforated at 4,542-55 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Kerr-McGee 1 Alta, C SE NW 11-4n-3w, flowed 110 bbl. 41°-gravity oil from Gibson at 6,744-60 ft. and 6,765-78 ft., TD 8,943 ft., OWDD, geological test in SE New Hope, was Viola producer from 7,530-70 ft.

Grant County: Sinclair 1 Mulkey, NW NW NE 7-25n-4w, flowed 412 bbl. 45°-gravity oil from second Wilcox at 5,816-20 ft., TD; Chase 1,160 ft., Deer Creek 2,489 ft., Oread 3,102 ft., Tonkawa 3,642 ft., Layton 4,162 ft., Hogshooter 4,327 ft., Checkerboard 4,463 ft., Big lime 4,622 ft., Oswego 4,676 ft., Verdigris 4,941 ft., Mississippi lime 5,146 ft., Woodford 5,695 ft., Simpson 5,766 ft., first Wilcox 5,790 ft.

Marshall County: Bale 1 Little, SW SE SE 4-6s-6e, pumped 50 bbl. 38°-gravity oil from bromide sand at 3,200-3,390 ft., TD; Woodford 1,954 ft., no Sylvan, Viola 2,070 ft., bromide dense 2,682 ft., first bromide sand 2,986 ft.

OKLAHOMA WILDCAT FAILURES

Grady County: Carpenter & Powell 1 McClellan, N 2 NE SE 17-5n-7w, dry, TD 2,532 ft.

Jefferson County: Gulf 1 Barrett heirs, SW SW SE 11-6s-6w, dry, TD 2,961 ft.

Muskogee County: Harwood 2 Ross, NE SE NW 30-15n-18e, dry, TD 1,350 ft.

Okfuskee County: Kelorma 1 Miller, NW NE NE 13-12n-10e, dry, TD 3,608 ft.

Gulf 1 Phillips, NW NE SE 32-13n-7e, dry, TD 4,527 ft.

Pawnee County: Jernigan & Morgan 1 Miner, NE NW SW 23-20n-5e, dry, TD 3,307 ft.

Pontotoc County: B. B. Oil 1 Breco, SE SE SW 20-4n-5e, dry, TD 2,051 ft.

Mizel Bros. 1 Floyd, NW NE NE 30-4n-5e, dry, TD 1,579 ft.

Pottawatomie County: British-American 1 Spencer, NW NW NW 20-9n-4e, dry, TD 5,309 ft.

Kansas

Adams Ranch Discovery Gets Top Oil Potential

THE maximum potential rating (3,000 bbl. per day) has been established by Columbian Fuel Corp. and Helmerich & Payne, Inc., at their 1-D Adams, oil discovery well of the Adams Ranch field, southern Meade County, in the southwestern part of the state. In an actual production test made previously, the well flowed approximately 85 bbl. of oil in 12 hours through 11/64-in. choke. Production is from the Marmaton zone (Pennsylvanian), opposite which casing is perforated at 5,346-50 ft.

Location of the well in the NW SE NW 25-34-30 is approximately a mile southwest of the original discovery well, completed in 1948 as a gas-distillate producer in the Morrow sand, lower in the Pennsylvanian. One other well, located 1½ miles to the southeast, has been completed. It also is a gas-distillate producer from the Marmaton.

Two miles east of the newly developing Light pool in adjoining Seward County, J. M. Huber Corp. is completing a small gas well at its 1 Loffland-Hawks, C SE NW 18-35-31. With casing perforated at 5,955-6,015 ft. opposite Morrow sand, the well flowed at an estimated rate of 2,060,000 cu. ft. per day. Hole was drilled in 1946 by H. L. Hunt and abandoned at a total depth of 8,005 ft. The present operator cleaned out and ran 7-in. casing to 6,353 ft. in the Mississippian. Top of the Morrow is 5,927 ft. Location is about ¼ mile north of the Beaver County, Oklahoma, line.

Laura Jane Oil Co. 1 Johnson, SE SE SE 33-27-5, a mile north of the North Landsdown pool, eastern Kingman County, has found promising oil and gas showings in Mississippian dolomite, main productive zone of other pools opened in the active development that has taken place along the Kingman-Sedgwick county line the past year. Top of the dolomite was logged at 3,781 ft. A 60-minute drill-stem test taking in an interval at 3,769-93 ft. (bottom 12 ft. in dolomite) yielded 650 ft. of oil and gas-cut mud with about 120 ft. of water.

In Barton County, W. J. Coppinger 1 Werne, NW SW NE 4-20-12, 1½ miles west of the Hammer pool, swabbed at the rate of 4 bbl. of oil per hour while testing Arbuckle lime, topped at 3,384 ft. and drilled to 3,402 ft. Pumping equipment is being installed.

KANSAS SUCCESSFUL WILDCATS

Clay County: Turner et al 1 Tannehill, C E/2 W/2 NW 15-9s-4e, pumped 4 bbl. oil from Mississippian at 1,892-1,922 ft., TD; Wakefield area revived.

Finney County: Hartman 1 Damme, SE SE NW 21-22s-33w, pumped 1,795 bbl. 32.5°-gravity oil from Mississippian at 4,711-19 ft., TD 4,805 ft., Hollenberg 2,488 ft., Herrington 2,522 ft., Krider 2,538 ft., Odell 2,555 ft., Winfield 2,572 ft., Gage 2,602 ft., Ft. Riley 2,634 ft., Heebner 3,770 ft., Lansing-Kansas City 3,812 ft., base Kansas City 4,297 ft., Marmaton 4,300 ft., Cherokee 4,450 ft., Patterson sand 4,628 ft., Mississippi lime 4,637 ft.

Kingman County: Lion Oil 2 McMichael, SE SE SW 13-27s-10w, 432 bbl. oil from Viola at 4,265-78 ft., TD 4,470 ft., Lansing-Kansas City 3,471 ft., Mississippi lime 4,002 ft., Simpson shale 4,356 ft., Simpson sand 4,363 ft., Arbuckle 4,455 ft.

Rice County: Dozier 1 Maupin, SE SW SW 1-18s-8w, pumped 30 bbl. oil from Lansing at 3,198-3,209 ft., TD 3,270 ft., Heebner 2,676 ft., lime 2,802 ft., Kinderhook 3,241 ft., Viola 3,262 ft.

Lewis (was Dozier) 1 Schroeder, NE NE NE 10-18s-9w, 212 bbl. oil from conglomerate at 3,241-67 ft., TD 3,336 ft., Lansing-Kansas City 2,891 ft., Sooy 3,213 ft., Arbuckle 3,286 ft., old dry hole worked over.

Rooks County: Herndon 1 Turner, SW SE NW 8-8s-17w, pumped 98 bbl. oil from Arbuckle at 3,299-3,319 ft., TD; Heebner 2,970 ft., lime 2,980 ft., Lansing-Kansas City 3,001 ft.

Russell County: Braden 1 Opdycke, CNL NE NW 29-14s-13w, pumped 35 bbl. oil from Tarkio at 2,281-86 ft. and 2,332-36 ft., TD 2,942 ft., OWWO, was producer from Lansing-Kansas City topped at 2,899 ft.

Saline County: Carey 1 Oberg, NE NE NE 35-15s-4w, pumped 1,186 bbl. oil from Maquoketa dolomite at 3,412-16 ft., TD; Mississippi lime 2,906 ft.

Sedgwick County: Allison 1 Stoltz, NE NE NE 10-27s-2e, 112 bbl. 44°-gravity oil from Simpson at 3,300-02 ft. and 3,308-09 ft., TD 3,316 ft., Kansas City 2,443 ft., Mississippi lime 2,908 ft., Kisener 3,200 ft., Kinderhook 3,114 ft., Viola dolomite 3,201 ft.

Stafford County: Skelly 1 Moses "A," SW SW NW 10-22s-13w, pumped 33 bbl. oil from 3,450-58 ft., TD 3,791 ft., OWWO, was producer from Arbuckle topped at 3,779 ft.

Sumner County: Texas Pacific 1 Metz, SE SE SW 6-32s-2e, 132 bbl. oil from Simpson at 3,735-41 ft., TD 3,784 ft., Stalnaker 2,480 ft., lime 2,812 ft., Kansas City 2,824 ft., Mississippi lime 3,400 ft., Arbuckle 3,778 ft.

KANSAS WILDCAT FAILURES

Barton County: Doley et al 1 Prudential Loan, SW SW NW 13-17s-14w, dry, TD 3,531 ft.

Midwestern Drillers 1 Hickel, SE SW SW 18-18s-11w, dry, TD 3,457 ft.

Alpine et al 1 Kimpler, SW SW NE 30-18s-11w, dry, TD 3,417 ft.

Tatlock 1 Spitzmiller, SW SW SW 20-18s-13w, dry, TD 3,456 ft.

Chase County: Bachus & Sons 1 Thurston, SE SE NE 17-19s-7e, dry, TD 2,016 ft.

Cowley County: McNeish & Gralapp 1 Howell, NE NE SW 26-31s-4e, dry, TD 2,999 ft.

Alpine 1 Bernstorf, SW NW NE 4-32s-4e, dry, TD 3,339 ft.

Ellis County: Aylward and NCRA 1 Schmidt, SE SE SE 14-12s-17w, dry, TD 3,823 ft.

Lotus 1 Dortland, SE SW NE 23-13s-16w, dry, TD 3,446 ft.

Ellsworth County: Alpine 1 Novonty, SW SW NW 18-16s-10w, dry, TD 3,446 ft.

Todd 1 Soeken, SW SW SE 25-17s-9w, dry, TD 3,296 ft.

Graham County: B&R 1 Kellogg, NE NE NE 18-6s-23w, dry, TD 4,101 ft.

Lyon County: Carter 1 Davidson, NE NE SE 29-15s-11e, dry, TD 3,470 ft.

McPherson County: Aladdin 1 Boeseker, NW NE SW 21-20s-1w, dry, TD 3,073 ft.

Rush County: Lockhart 1 Leiker, NE NE SW 5-16s-18w, dry, TD 3,670 ft.

Brack 1 Rogers, NE NE SE 12-17s-20w, dry, TD 4,010 ft.

Russell County: Kramer-Stearns 1 Kramer, SW SW SW 6-11s-15w, dry, TD 3,570 ft.

Saline County: Northwestern Drillers 1 Carlson, SE SE SE 34-15s-4w, dry, TD 3,607 ft.

Sedgwick County: Mayer 1 Welch, NW SW SW 29-27s-2e, dry, TD 3,399 ft.

Adair 1 Krehbiel, SE SE NW 10-29s-2e, dry, TD 3,410 ft.

EASTERN NEBRASKA WILDCAT FAILURE

Harlan County: B&R 1 Shellenberger, NW NW SW 6-1n-18w, dry, TD 3,550 ft.

Rocky Mountain

Tertiary-Area Drilling Play Continues in Uinta Basin

DENVER.—The exploratory drilling campaign through the Tertiary area of the Uinta basin is continuing at a rapid rate. Carter Oil Co. has led this program, but new operators are joining in exploring through the large basin covering northeastern Utah. Carter is now rigging up rotary at the Duchesne Unit wildcat in the C SE NE 17-4s-4w (USM), where a fire 2 weeks ago burned the rig. This well is at 7,550 ft., total depth, and on drill-stem test of the basal Green River fractured-shale zone made 4,680 ft. of oil and mud. The operator will retest this zone prior to decision on deeper drilling.

Carter and Stanolind Oil & Gas Co. are now drilling two additional wells in Roosevelt pool, where they have two basal Green River producers.

Phillips Petroleum Co. is drilling 3 miles west of the closest Roosevelt producer.

The California Co. is drilling two extensions in the Red Wash area, southeast of Roosevelt, where the company has two producing wells.

Sun Oil Co. has a wildcat at South Ouray, C NE NE 22-9s-20e, south of previous drilling in the area. Carter is now in the process of unitizing two additional blocks, Willow Creek and Jack Canyon, along the south side of the Tertiary area of the basin, and will drill deep tests on these units.

Continental Oil Co., with lease holdings throughout the basin, is now preparing to drill at least one, and probably two, wildcats in Uinta County.

Initial testing on the Plains Exploration Co. wildcat at 1 Dalke, SE SE SW 22-8n-54w, in the Logan area, Logan County, Colorado, is disappointing in the J (Dakota) sand. The well topped the sand at 5,196 ft., with saturation first logged at 5,220 ft. The well flowed oil in 51 minutes on drill-stem test 5,235-51 ft. It was drilled to 5,303 ft., total depth, and casing was cemented through the formation. The well filled with water when the zone from 5,242-44 ft. was perforated with 8 shots. Plains has squeezed the zone and will continue perforating and testing on the wildcat. This week British-American Oil Producing Co.; Ginther-Warren-Ginther, Houston; Brown Drilling Co., Los Angeles; Continental Oil Co., and Ohio Oil Co. announced new wildcat locations in the Denver-Julesburg Basin.

South Texas Development Co. completed the discovery in the Messex area, Morgan County, Colorado, for a gage of 132 bbl. of oil daily through 20/64-in. choke. Production is from Dakota at 5,021-5,125 ft. Shell Oil Co. is now drilling a northwest offset to the discovery. This field is west of Merino pool, Logan County, where Ohio and Trigood Oil Co. have production from the same zone.

J. D. Hancock completed a small gas well from the Pictured Cliffs at Gallegos Canyon, San Juan County, New Mexico.

Cities Service Oil Co. plugged the Widdecomb Creek, Wheatland County, Montana, wildcat.

Skelly Oil Co. is starting a wildcat in the North Immigrant Gap area, Natrona County, Wyoming, in SW SW NW 10-34n-82w, with the well planned as a Madison test.

Shell Oil Co. is drilling another wildcat, the company's third, in the LeRoy area, Uinta County, Wyoming. The well is 3 Unit, NE NW NW 33-16n-117w.

In the Johnson Canyon area, northwest of Barker Creek dome, Montezuma County, Colorado, Tide Water Associated has made location for 1 Ute, C SE SW 8-33n-14w, an important Pennsylvanian test of this area.

Shell Oil has made location for another important wildcat in eastern Montana. It is 1 Unit, SW SW NE 30-12n-57e, on the Pine Unit southeast of the company's present deep test in this general area.

COLORADO WILDCAT SUCCESS

Messex, Morgan County, South Texas Development Co. 1 State, NE NE NW 1-5n-55w; TD 5,125 ft.; flowed 132 bbl. oil through 20/64-in. choke in 10½ hours. Niobrara 4,134 ft., Greenhorn 4,648 ft., Muddy 4,938 ft., Dakota 5,021 ft.

COLORADO WILDCAT FAILURES

San Luis Valley, Alamosa County: Orin Tucker 1 Whittier, SW SW SW 10-40n-9e; TD 2,423 ft.; suspended indefinitely.

Yenter, Logan County: Vaughey & Vaughey 1 Budin, SE SE SE 12-8n-55w; TD 5,667 ft., abandoned. Niobrara 4,338 ft., Ft. Hays 4,670 ft., Greenhorn 4,900 ft., "D" sand 5,154-88 ft., "J" sand 5,252-5,355 ft., Lakota 5,515-90 ft., Morrison 5,608 ft.

Ft. Morgan area, Morgan County: R. W. Holt 1 Poe, C NE NE 11-3n-59w; TD 6,084 ft., abandoned. "D" sand 5,815 ft., "J" sand 5,952 ft.

Orchard area: Orin Tucker et al 2 Orchard-State, SW NE SE 16-4n-60w; TD 6,500 ft., PB 6,320 ft.; abandoned. Niobrara 5,576 ft., "D" sand 6,267 ft., "J" sand 6,341 ft.

MONTANA WILDCAT FAILURE

Widdecomb Creek, Wheatland County: Cities Service Oil Co. 1 Cooney, C NE SE 30-6n-16e; TD 7,946 ft., abandoned. Muddy 6,680 ft., first Cat Creek 6,880 ft., Kootenai 7,100 ft., third Cat Creek 7,222 ft., Morrison 7,327 ft., Ellis 7,570 ft., Tensleep (sample) 7,748 ft.

WYOMING WILDCAT FAILURES

SE Castle Creek, Natrona County: Seaboard & Atlantic 61-27-G, NE NW NE 27-37n-80w; TD 4,770 ft.; abandoned. Nobrara 2,520 ft., first Wall Creek 3,352 ft., second Wall Creek 3,711 ft., third Wall Creek 3,853 ft., Muddy 4,558 ft., Dakota

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4,692 ft., Lakota 4,780 ft., Morrison 4,828 ft.

South Dakota High, Niobrara County: Sharp & Nielson 1-X-X Alter, SW SW SW 14-34n-64w; TD 1,456 ft.; abandoned.

NORTHERN NEW MEXICO WILDCAT SUCCESS

Gallegos Canyon, San Juan County: J. D. Hancock 2 Edgar, SW NE SW 12-27n-12w; TD 1,795 ft.; initial prod. 2,630 M.c.f gas in 3 hours; Pictured Cliffs 1,691 ft.

WESTERN NEBRASKA WILDCAT FAILURE

Cheyenne County: Service Drilling Co. 1 Higgins, NW NW SW 26-16n-51w; TD 5,334 ft., abandoned. Pierre 1,068 ft., Niobrara 4,100 ft., Ft. Hays 4,358 ft., Codell 4,471 ft., Carlile 4,481 ft., Greenhorn 4,658 ft., first sand 4,926 ft., Muddy 5,072 ft., Skull Creek 5,133 ft., Dakota 5,273 ft.

Mississippi

Franklin County Test Finds Oil in Baker Zone of Wilcox

JACKSON.—A new Wilcox discovery seems in the offing in southwestern Franklin County at the Dave Gammill-Lyle Cashion Co. 1 D. F. Anderson, 3-5n-1e, approximately 5 miles south of the Roxie field. Total depth is 7,000 ft., and sidewall samples have indicated good shows of oil in the Baker zone of the Wilcox. Saturation was found at 6,261-70 ft. with the water contact reported at 6,270 ft. At last reports, production casing had not been set. The test is being supported by Pure Oil Co., Honolulu Oil Corp., Sun Oil Co., Lion Oil Co. and Midstates Petroleum Corp.

Continental Oil Co. is moving in surface equipment to complete its new discovery well in Madison County northwest of the city of Canton. The nomenclature committee of the Mississippi Geological Society has recommended that the new producing area be called "Virlillia," the name of the plantation on which the discovery is located. The wildcat is Continental's 1 J. R. Cameron, et al, SE SW 36-10n-1e. The test has been perforated twice; first at 10,679-90 ft. and then at 10,559-63 ft. Oil was produced on both tests with the second try showing less water. Both were in the Hosston formation. On the latest test, the well flowed at a rate of 192 bbl. of oil and 17 bbl. of salt water per day. Initial tests in the Continental well were made in the Smackover lime from open hole at 13,783-13,970 ft. and the test produced gas at the rate of 2,760 M.c.f. per day.

Church Hill field, Jefferson County, has a third producer completed. The latest well, Kirby Petroleum Co. 2 Sam Woods, 2-8n-2w, found a new pay sand. It bottomed at 6,097 ft. and on potential test flowed 206 bbl. of 40°-gravity oil per day on ¼-in. choke from perforations at 5,468-71 ft. Production is from the Artman zone of the Wilcox. The test is ½ mile south and slightly west of the discovery well.

Zach Brooks Drilling Co. 1 Bush Heirs & Williamson, 10-10n-19w, a wildcat in Simpson County, 4 miles north of Gwinville field, has been abandoned as dry at total depth of 9,931 ft. in Lower Cretaceous. The test was 270 ft. lower than the most northerly well in the Gwinville field.

MISSISSIPPI WILDCAT FAILURES

Amite County: Norman Germany - Austin Stewart 1 Crosby Lumber & Mfg. Co., 34-4n-2e, dry, TD 7,600 ft.

Simpson County: Zach Brooks Drilling Co. 1 Bush Heirs & Williamson, 10-10n-19w, dry, TD 9,931 ft.

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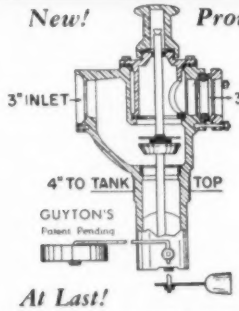

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Southwest Texas

Lime Formation on Dilworth Salt Dome Flank Yields Oil

CORPUS CHRISTI.—An important oil discovery has been made in McMullen County, on the east flank of the Dilworth salt dome, 4 miles west of Tilden, by H. R. Smith, et al. The operator's 1 C. Martin Estate, Nancy Wright Survey 18, A-491, flowed an estimated 150 bbl. daily through $\frac{1}{8}$-in. choke from perforations at 8,355-64 ft., 8,378-85 ft., and the 8,400-ft. level. The well went to water after 8 hours of flowing, but this is believed to have been caused by leaking below the bridge plug. The operator plans to attempt another completion. The Smith well is of wide interest for two reasons: it is believed to be the first production found from lime sections on any South Texas salt dome, and the dome itself is out of what was heretofore believed to be the South Texas salt-dome basin.

The Texas Co. 1 Pate Gas Unit, a wildcat in Hidalgo County, flowed 7,000 M.c.f. of gas daily while being tested with four different choke sizes. The well has a gas-oil ratio of 71,430:1 and produces 58.3°-gravity condensate from perforations at 6,253-63 ft. Operators have total depth of 8,000 ft. and set 5½-in. casing at 6,382 ft. The test is located on a 160.8-acre lease, Antonia Gutierrez Survey, Porcion 63.

C. C. Dauchy & Miller Royalty Co. 1 Jane Burns, wildcat in Atascosa County, 10 miles northwest of Charlotte, has produced at the rate of 25 bbl. daily on pump from open hole at 3,550-67 ft. in the Navarro zone. It is located on a 160-acre lease in Francis Oerelling Survey 1336, A-654.

Lee Brothers Oil Co. 1 A. A. Miller, wildcat in western San Patricio County 1½ miles west of Willmann field, has opened a new oil area. The test flowed 84 bbl. of 26°-gravity oil per day on 10/64-in. choke, tubing pressure 185 psi., and gas-oil ratio of 166:1. Production is from perforations at 3,696-3,704 ft. and total depth is 4,654 ft. with 5½-in. casing set at 3,750 ft.

The Chicago Corp. 1 Bessie H. Cocke, wildcat in Starr County, 3 miles southwest of Guerra field, has been completed as a gas discovery. On open flow, the test made 8,200 M.c.f. daily of dry gas on various-sized chokes. Total depth is 2,510 ft. and 5½-in. casing is set at 2,265 ft. with perforations at 2,223-27 ft. The test is located in El Javali Grant, 1½ miles east of Marks field.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Atascosa County: Oil discovery—Martin, Shelly & Thomas 1 Katie Richter, William Echols Sur. 1184, A-234, TD 1,903 ft., Carrizo 1,767-73 ft., IP: 83 bbl. oil per day on pump, 22.9° gravity.

Duval County: New pay at Hagist Ranch—The Texas Co. 1 Hagist Ranch, Inc., NCT-1, Z. Benson Sur. 288, A-1633, TD 7,456 ft., Frio 834-46 ft., IP: 362,000 cu. ft. of gas per day, 5/16-in. choke.

San Patricio County: New pay at West Sinton—Wymore Oil Co. 1 Lillie Caddell, John Pollan League, drilled deeper, TD 4,475 ft., perf. 3,378-81 ft., IP: 63 bbl. oil ¼-in. choke, 22° gravity.

Starr County: New pay at Marks—The Texas Co. 4 W. D. Hornaday, El Javali Juan Flores Heirs Sur., TD 2,071 ft., open hole 2,064-71 ft., IP: 165 bbl. oil per day, 20/64-in. choke, 34.6° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Brooks County: L. M. Lockhart 1 Laurence D. Miller Sur., "El Tule" Juan Jose Guerra Grant, A-257, dry, TD 6,691 ft.

Duval County: Gilbert L. Brown 1 J. F. Welder, et al, Norman G. Collin Sur., A-868, dry, TD 3,059 ft.

J. W. Gorman & Jas. G. McCarrick, et al, 1 Rosa A. Wright, Arnold & Barrett Sur. 47, A-768, dry, TD 5,862 ft.

Mortimer & Killam 1 J. B. Pearl, Estate, Sur. 390, ¾ mi. E of W end of Lopez field, dry, TD 4,220 ft.

Jim Hogg County: O. W. Killam 2 R. Holbein, Lot 43, Sec. 17, Share 3, Las Animas Grant, dry, TD 3,500 ft.

Jim Wells County: Appell Drilling Co. 3 George Reynolds, N. Rudder Sur. 31, A-409, dry, TD 4,600 ft.

Chas. A. Daubert & Walter J. Achning 1 Scott E. McNeill, Bodie Subd., Cast Blanca Grant, dry, TD 5,380 ft.

Kerr County: W. D. Owen 1 F. Tatsch, GS&SF Sur. 1061, dry, TD 2,650 ft.

Kimble County: Harry Bass Drilling Co. and Atlantic Refining Co. 1 Sophie Thiers, GWT&P Sur. 79, Block A, dry, TD 3,819 ft.

Nueces County: Atlantic Refining Co. 1 A. T. Pearse, Enrique Villareal Sur., A-1, dry, TD 10,482 ft.

Starr County: Continental Oil Co. D-22 M. M. Garcia, Sec. 908, A-846, dry, TD 6,385 ft.

Webb County: Harold K. Boysen A-1 Armstrong & Strohman, Share 5, Las Animas Grant, dry, TD 3,352 ft.

Williamson County: F. William Carr 1 Maggie Mather, Nathaniel Campbell Sur., dry, TD 7,545 ft.

Charles B. Duke 1 W. E. Cox, Miguel Davilla Sur., dry, TD 780 ft.

Zapata County: F. P. Zoch, Jr., A-1 Ramirez, et al, dry, TD 1,007 ft.

South Louisiana

Oil Shows Indicate New Production in Acadia Parish

NEW ORLEANS.—Cities Service Oil Co. has indications of a new oil discovery 1½ miles east of Richie field, Acadia Parish, at 1 Winstin Atteberry, 41-1s-1e. The well is bottomed at 10,000 ft. and operator ran electric log and set 7-in. protection string at 9,617 ft. In sidewall samples and electric log, the well had oil shows at 9,194 ft., 9,203 ft., 9,436-44 ft., and 9,460-64 ft. It also is reported to have a 17-ft. oil section at 9,187-9,204 ft.

A southeast offset to the Lake Maurepas discovery in Livingston Parish has been abandoned by Roeser & Pendleton at total depth of 10,002 ft. The firm's 1 State Lease 1,474 is located approximately 2,000 ft. southeast of the discovery.

It is interesting to note that the east offset to the discovery, Shell Oil Co. 1 State Lease 1,469 flowed 292 bbl. of oil daily on initial production test. Perforations were effected at 9,851-60 ft. and the flow was gaged through 12/64-in. choke.

Humble Oil & Refining Co. 1 State Lease 1,865, also in Lake Maurepas field, is drilling below 1,869 ft.

The California Co. has completed a third discovery in Bay Coquille, Plaquemines Parish. The firm's 1 State Lease 1,784 has been potentialed for 168 bbl. of 28.8°-gravity oil daily through 8/64-in. choke. Production is through perforations at 7,704-09 ft. This well is located approximately 8 miles northwest of 1 State Lease 1,785, an earlier discovery referred to as Central Bay Coquille. There are two offsets to the central well, of which one is producing and the other being drilled.

In Lake Borgne, Orleans Parish, The Texas Co. 1 State-Lake Borgne, wildcat, flowed salt water through perforations at 9,457-72 ft. Operator squeezed off perforations and will probably come up the hole for another test. The well is bottomed at 13,270 ft.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Assumption Parish: New pay at Napoleonville Dome—American Republics Corp. 1 Alex Simoneaux, 43-12s-13e, TD 5,530 ft., perf. 5,436-46 ft., IP: 88 bbl. of oil per day, 10/64-in. choke, 33° gravity.

West Baton Rouge Parish: Gas-distillate discovery—Sohio Petroleum Co. B-1 A.

Wilbert & Sons, 31-7s-11e, Grosse Tete prospect, TD 10,145 ft., perf. 10,030-36 ft., IP: 53 bbl. condensate per day, 10/64-in. choke, 52.6° gravity, TP 3,250 psi.

Eastern Texas

Developing Sandusky Area Gets Three 9,000-Ft. Tests

DALLAS.—The Sandusky area of Grayson County, steadily shaping into a field of major importance, was given three 9,000-ft. wildcats this week. The new tests are by Indian Royalty Co., Oklahoma City. They are 1, 2, and 3 S. F. Brooks, all in the William Allen Survey, 6 miles southeast of the town of Sandusky.

L. O. McMillan was moving in materials for an Oil Creek sand test at the 1 D. A. McCoy, in the E. Hartzog Survey and ¾ mile southeast of The Texas Co. 1 Marshall, Ellenburger discovery of the Sandusky field. Projected depth was 7,500 ft. McMillan drilled the Oil Creek discovery wells east and north of the town.

In the McLeod Survey, Magnolia Petroleum Co. 1 Hodges recovered 950 ft. of oil and 50 ft. of oil and gas-cut mud on a 1½-hour drill-stem test at 7,533-60 ft. It cored dolomite and sand from 7,560-75 ft., and continued drilling at 7,573 ft.

Mid-Continent Petroleum Corp. 1 Carson, extension try in the J. Barefoot Survey, was drilling ahead at 7,599 ft. following a 1-hour test at 7,512-70 ft.

George Humphrey 1 Barnes, southwest of Hagerman, reported top of the Woodford shale at 7,434 ft. and top of the Hunton lime at 7,573 ft. Drilling continued below 7,845 ft.

Benedum-Trees Oil Co. has scheduled a 9,500-ft. Travis Peak wildcat in eastern Nacogdoches County as the 1 T. P. Green, 3 miles northwest of Attayoc.

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Imperial Producing Co. 1 Lindsey, Harrison County wildcat 2 miles northwest of Jonesville, flowed an estimated 200 bbl. of 38°-gravity oil a day from perforations at 6,095-99 ft. in the Travis Peak. Completion potential was to be made. The Pettit limestone had a show of gas in cores at 5,925-36 ft. but apparently was not tested.

Skeeters & Curry 1 Cock, wildcat southeast of Hallsville, prepared to perforate after setting casing at 6,805 ft., 3 ft. off bottom. Drill-stem test at 6,522-35 ft. had recovered heavily gas and distillate-cut mud.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Falls County: Green & Huff 1 J. H. Ward, I. Beasley Sur., dry, TD 1,311 ft., elev. 522 ft., Buda 1,291 ft.

Hunt County: John B. Coffee 1 Scott Leinart, Wm. Mason Sur., dry, TD 4,201 ft. in the Paluxy, Woodbine 2,710 ft.

Van Zandt County: W. B. Baker 1 W. A. Abell, R. W. Berry Sur., dry, TD 4,742 ft. in the basal Woodbine.

North Central Texas

New Mississippian Seen For Throckmorton County

WICHITA FALLS.—New Mississippian production for Throckmorton County was in sight at Warren Oil Corp. 1 Annie Johnston, Block 1,643, TE&L Survey, which flowed 78.78 bbl. of oil in 10 hours through 12/64-in. choke, following acid treatment in the lime from 4,514-22 ft. Top of the limestone was 4,510 ft. The new producer prospect is east of Woodson and about 1 mile southwest of Caddo production.

Cities Service Oil Co. 1-80 SMS Ranch, wildcat northwest of Throckmorton, had oil-cut mud on a 2-hour drill-stem test from 4,938-46 ft. in the lower Caddo, and was drilling ahead below 5,026 ft. Recovery was 230 ft. of oil-cut mud plus 60 ft. of salt water.

Northeast of Record Mississippian field, Woodson Oil Co. Buchana found that formation dry from top at 4,670 ft. to 4,800 ft., and was plugging back to test in the upper Caddo. While drilling, a section from 4,043-74 ft. showed for production.

Cities Service Oil Co. completed its 1-140 Flat Top, southeastern Stonewall County wildcat, as a Swastika sand discovery. The well had top of the sand at 3,363 ft. and was drilled to 3,403 ft. Completion was 333 bbl. of 40°-gravity oil a day, flowing through ¼-in. choke with gas-oil ratio of 422 ft. Nearest Swastika production is in the Moutray-Moore field some 10 miles to the northwest. Signal Oil & Gas Co. and Lone Star Producing Co. have an interest in the new well.

In Young County Warren Oil Corp. 1 Orton Bennett, southwest of Bryson, recovered 90 ft. of oil on a drill-stem test at 3,867-75 ft., but developed mud with no shows on a second test at 3,875-85 ft. Operators were running electrical surveys. Top of the Caddo was 3,814 ft.

In Haskell County, E. K. & E. M. Burt 1 Swenson, 13-1-BBB&C, developed 10 ft. of clean oil and 65 ft. of mud-cut oil on a drill-stem test of Swastika sand from 2,462-82 ft. Location is 2 miles northwest of Stamford.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) SUCCESSFUL WILDCATS

Clay County: Deep Rock Oil Co. 1 Gossett, J. Diaz Sur., 2 mi. NE Newport, TD 4,053 ft., pay 4,027 ft., IP flowed 135.5 bbl. 40°-gravity oil a day, 16/64-in. choke, TP 50 psi., GOR 350:1.

Jack County: Rankin & Pitcock 1 A. B. Salter, Samuel Tollett Sur., 10 mi. SE Jacksboro, TD 5,520 ft., Caddo conglomerate pay 4,953 ft., IP 5,500,000 cu. ft. gas, plus estimated 20 bbl. oil per 1,000,000 cu. ft.

Ward & McCullough 1 W. D. Moore, SPRR

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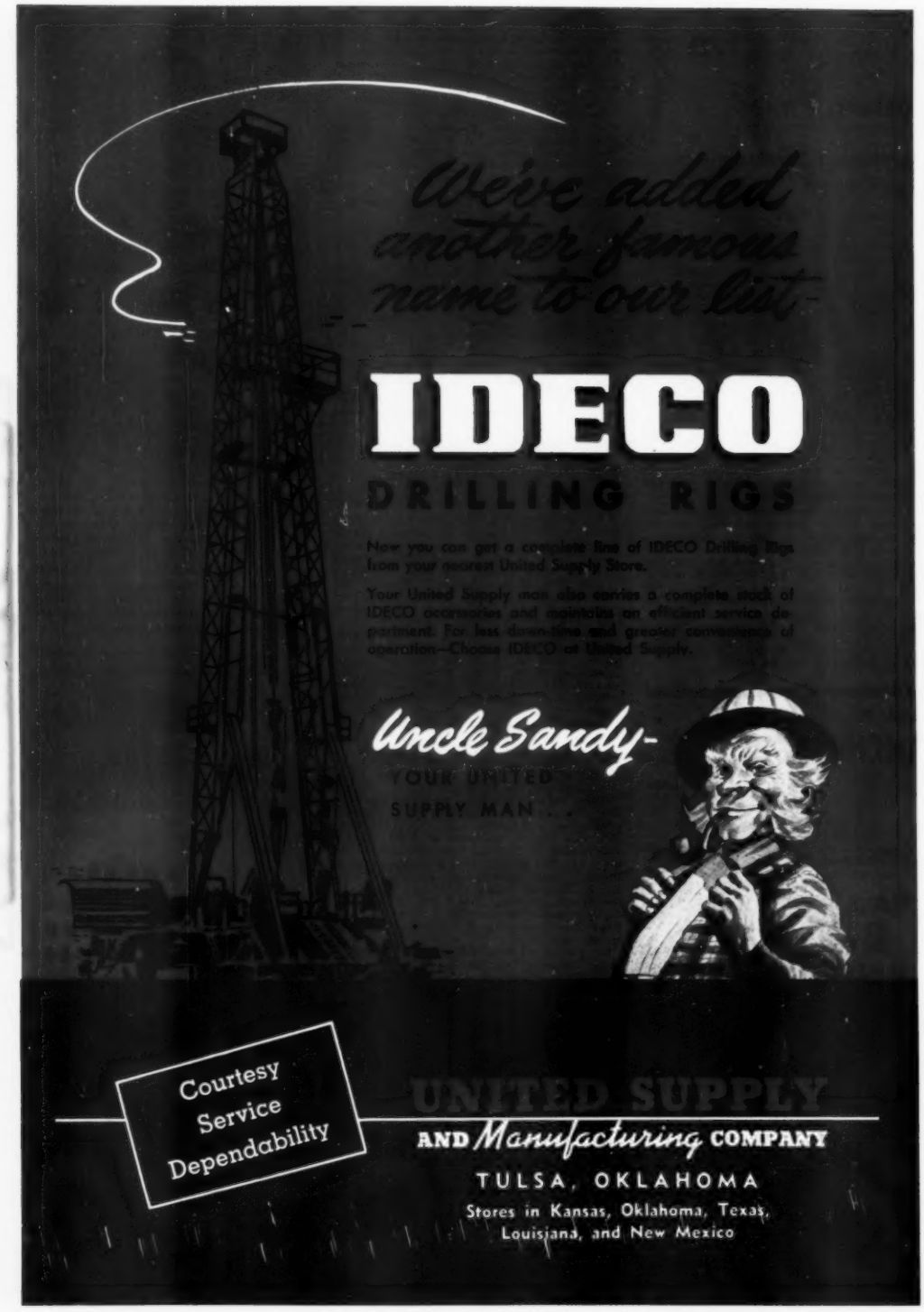
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Sur., 3½ mi. SW Antelope, TD 3,644 ft., Bryson sand 3,618 ft., IP flowed 420 bbl. 42°-gravity oil a day, ¼-in. choke, GOR 17:1, TP 100 psi.

Jones County: Clark & Cowden Drilling Co. 1 J. M. Alexander, OAL Sur., 10 mi. E Anson, TD 3,319 ft., elev. 1,626 ft., King sand 2,171 ft., IP pumped 7½ bbl. oil a day.

G. E. Kadane & Sons 1 V. D. Parham, OAL Sur., 7 mi. SW Avoca, TD 2,287 ft., King sand 2,284 ft., IP pumped 44 bbl. 40°-gravity oil a day.

V. C. Perini, Jr. 1 S. R. Brooks, 28-2-SPRR, 6 mi. W Anson, TD 3,130 ft., Swastika 3,123 ft., IP flowed 264 bbl. 40°-gravity oil a day, ½-in. choke, TP 50 psi., GOR 1,000:1.

Sohio Petroleum Co. and The Chicago Corp. 1 Iva Touchstone, 9-17-T&P, 2 mi. SE Truby, TD 4,668 ft., elev. 1,731 ft., Strawn 4,385 ft., pay 4,444 ft., IP flowed 222.7 bbl. 41°-gravity oil a day, 24-64-in. choke, TP 250 psi., GOR 617:1.

Stonewall County: McAlester Fuel Co. 1 Mrs. Ella Burnell, T. Constable Sur., 12 mi. NE Aspermont, TD 6,075 ft., elev. 1,656 ft., Caddo 5,820 ft., perf. 5,943-51 ft., IP flowed 254 bbl. 40°-gravity oil a day, 24/64-in. choke, TP 125 psi., GOR 200:1.

Oxford Drilling Co. 1 W. H. Bennett, 171-1-BBB&C, 7 mi. NE Hamlin, TD 5,412 ft., perf. Strawn 5,324-38 ft., IP pumped 58 bbl. 44°-gravity oil a day.

Oxford Drilling Co. 2 Bennett, 171-1-BBB&C, 8 mi. NE Hamlin, TD 2,689 ft., pay 2,674 ft., IP flowed 656 bbl. oil a day, 24/64-in. choke, TP 175 psi.

Taylor County: Saxon Exploration Co. 1 G. C. Billingsley, Abner Woolsey Sur., 4½ mi. SW Lawn, dual completion; TD 4,615 ft., elev. 1,984 ft., perf. Gardner 4,255-59 ft., IP flowed 443 bbl. 41°-gravity oil a day, 20/64-in. choke, TP 420 psi., GOR 740:1; perf. Morris 3,815-19 ft., IP flowed 356 bbl. 40°-gravity oil a day, 24/64-in. choke, CP 225 psi., GOR 410:1, top Gardner 4,253 ft., Morris 3,815 ft., Saxon-Guion proposed field name.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Deep Rock Oil Co. 1 Victor Morbitzer, 63-3-Clark & Plumb, dry, TD 4,409 ft.

Leland Fikes et al 1 M. J. Kunkel, BBB-&C Sur., A-54, dry, TD 5,260 ft.

Schultz & Jackson 1 J. A. Poirot, G. W. Barnett Sur., dry, TD 1,400 ft.

D. D. Strange 1 J. Metcalf, Blk. 5, Clark & Plumb, dry, TD 980 ft.

Baylor County: Ashland Oil & Refining Co. 1 V. J. Sykora, Sec. 3,103, TE&L, dry, TD 5,456 ft., Caddo 4,560 ft., Mississippian 5,369 ft.

Brown County: McLean-Roberts 1-B Cox & McInnis, Sec. 26, Osborne Dalton Sur., dry, TD 1,3250 ft., elev. 1,385 ft., Caddo 1,328 ft.

Callahan County: Bankline Oil Co. 1 Bryan Clinton, Sec. 14, BOH & Matilda Cherry Sur., dry, TD 1,701 ft.

Charles Kadane 1 Cottle, Sec. 3,196, TE&L Sur., dry, TD 3,475 ft., elev. 1,483 ft., Canyon lime 1,305 ft.

Ralph Lowe 1 L. K. Whitehead, Sec. 7, BBB&C, dry, TD 2,420 ft., elev. 1,969 ft., Noodle Creek 1,215 ft., Adams Branch 2,340 ft.

Texas Pacific Coal & Oil Co. 1 Loven, Sec. 354, G. Hancock Sur., dry, TD 4,625 ft., elev. 1,878 ft., Caddo 3,844 ft., Mississippian 4,379 ft., Ellenburger 4,394 ft.

Clay County: Ben Banner 1 J. B. Dunn, Sec. 19, Byers Bros. Subd., dry, TD 1,875 ft.

Bridwell Oil Co. 8-C Saner Estate, J. Massie Sur., dry, TD 1,967 ft.

Comanche County: J. K. Wadley 1 H. S. McBride, Sec. 3, CTRR, dry, TD 2,820 ft.

Eastland County: O. M. Slosson 1 J. W. Courtney, 32-4-H&TC, dry, TD 3,761 ft., elev. 1,506 ft., Capps 1,285 ft., base Caddo 3,216 ft.

Jack County: L. T. Burns 1 Roy Barry, Joshua Robbins Sur., A-490, dry, TD 3,088 ft.

W. H. Hammon 1-A A. V. Sartain, J. J. Gholson Sur., A-229, dry, TD 5,106 ft.

Texas Canadian Oil Corp. 1-A L. S. Wright, Z. S. Brooks Sur., dry, TD 865 ft.

Jones County: P. P. Langford 1 T. H. Rowland, Sec. 43, OAL Sur., dry, TD 3,152 ft., elev. 1,508 ft., Flippen 2,006 ft., Gunsight 2,229 ft., reef 3,028 ft.

Montague County: Stephens Petroleum Co. 1 Chandler, Thomas Green Sur., A-303, dry, TD 6,011 ft., elev. 907 ft., Ellenburger 5,905 ft.

Stephens County: Fred R. Harrell 1 W. P. Bradford, 66-6-T&P, dry, TD 2,100 ft.

F. Kirk Johnson 1 Blanche Winston, 39-5-T&P, dry, TD 2,004 ft.

Emil H. Swanson 2 W. E. Carey, 52-5-T&P, dry, TD 2,296 ft.

T. F. Vander Laan 1 J. L. Cowart, 40-4-T&P, dry, TD 2,605 ft.

Wasson Oil Co. et al 1 S. T. Swenson, Sec. 2, OAL Sur., dry, TD 2,248 ft.

Stonewall County: Woodley Petroleum Co. 1 S. A. Godfrey, 221-D-H&TC, dry, TD 6,702 ft., elev. 1,848 ft., Caddo 6,200 ft., Ellenburger 6,517 ft., Hickory 6,650 ft.

Taylor County: Sol Minzer 1 U. T. Stith, Sec. 25, Robert Turner Sur., dry, TD 2,505 ft., elev. 1,711 ft., Flippen sand 2,035 ft., Swastika lime 2,430 ft.

Throckmorton County: D. D. Feldman 1 Wm. Thomas, Block 3,067, TE&L Sur., dry, TD 5,316 ft. in the Ellenburger.

Wichita County: Frank Wood 1 W. T. Waggoner "NN," 35-5-H&TC, dry, TD 2,007 ft.

Young County: B. C. Deardorf 1 R. O. Medlin, Sec. 82, TE&L, dry, TD 5,215 ft., elev. 1,210 ft., Caddo 4,553 ft., Mississippian 5,104 ft.

Michigan

Promising Bay County Test Acidizing in Dundee Pay

MOUNT PLEASANT.—Tests were being made at P. O. Mutch's 1 Demary, SW SE SW 20-18n-3e, Gibson Township wildcat, Bay County, this week after a Dundee oil pay was drilled which showed 175 ft. of free oil in 36 hours and 500 ft. of oil after 90 hours. No water was showing. The Dundee lime top was logged at 2,997 ft., and first oil started to show at 3,090-98 ft. The oil show increased from 3,098-3,120 ft. Hole is under test at 3,159 ft., total depth. Acid treatment was ordered last week but no report of results of the attempted 1,000-gal. treatment were available.

Mutch's Demary wildcat, his second test in this general area, is located about 5 miles southeast of the Gibson-South Adams field, Bay and Arenac counties, and about 6 miles northwest of the Mount Forest Dundee oil pool.

On the basis of early information, well appeared to be structurally higher than most of the nearest correlating control points, and in many respects it appeared to be similar to the producers in the Mount Forest pool to the southeast.

Mutch controls approximately 1,500 acres in the area with other leases owned by Floyd Umphrey and R. H. Butterfield, Carter Oil Co., Ervin Major, and J. E. Bauer.

Offsetting a dry hole to the east and another duster to the south, P. K. Degenther and Clyde Miller drilled the third producer in the Dunningville Traverse field, Allegan County, at 3 Slotman, NW NW NE 27-3n-14w, Heath Township. This well was reported to be flowing an average of 400 bbl. of oil a day through a ½-in. choke following acid treatment in the Traverse with 750 gal. Traverse lime was logged at 1,412 ft. Pay showed 1,000 ft. of free oil in 36 hours natural at 1,423-26 ft. Hole was bottomed at 1,426 ft. Well was flowing the 400-bbl. a day average after one week of production. The 3 Slotman is the diagonal southeast 10-acre offset to the Dunningville field discovery well.

MICHIGAN SUCCESSFUL WILDCAT

Ogemaw County, Foster Township: Brazos Oil & Gas Co. KKK-1 State-Foster, N½ SE NW 25-24n-1e, 67 bbl. from Richfield, TD 4,245 ft. (Rose City field extension).

MICHIGAN WILDCAT FAILURES

Allegan County, Dorr Township: Swanson Consolidated Oil Co. 1 Fifelski, SW NE SW 24-4n-12w, Traverse 1,750 ft., dry, TD 1,756 ft.

Hopkins Township: Maury Roberts 1 Koloseik, SW SW NE 25-3n-12w, Traverse 1,691 ft., dry, TD 1,716 ft.

Martin Township: W. R. Swetland 1 Cutshaw, SW SW NW 11-2n-11w, Traverse 1,750 ft., dry, 1,782 ft.

Salem Township: Arthur Boeve 1 Westrate, SW NW SW 19-4n-13w, Traverse 1,637 ft., dry, TD 1,642 ft.

Watson Township: P. K. Degenther 1 Stone, SE NE NW 26-2n-12w, Traverse 1,677 ft., dry, TD 1,693 ft.

Arenac County, Standish Township: Ogma Development Co. and Basin Oil Co. 1 Miller, SE SE SE 17-18n-5e, Dundee 2,715 ft., dry, TD 2,931 ft.

Kent County, Lowell Township: Cities Service Oil Co. 1 fee, NE NW NW 12-6n-9w, Salina 3,430 ft., dry, TD 4,048 ft. (Being converted for use as artificial storage reservoir in the Salina for L.P.G.)

Livingston County, Unadilla Township: Wm. R. Albers 1 Biehn, NW SW NE 33-1n-3e, Cincinnati 3,770 ft., dry, TD 3,955 ft.

Texas Gulf Coast

Ohio Oil Prepares to Test Orange County Prospect

HOUSTON.—Ohio Oil Co. has run 7-in. production string to 8,071 ft. in its indicated Orange County discovery, 1 Lutcher Moore Lumber Co., located ½ mile south of Orange. This wildcat attracted attention when free oil was recovered on a drill-stem test at 7,980-90 ft. Tool was open 3 minutes, and recovrey was 3 bbl. of 40.1°-gravity oil. Core from 7,960-8,015 ft. contained 13 ft. of net sand with oil odor and taste.

At its new Wilcox strike in Washington County, Sinclair Oil & Gas Co. has tested 1 Bess Henry for 243 bbl. of 43.8°-gravity oil on initial production test. Production is through perforations at 9,214-18 ft. The discovery was drilled to a total depth of 11,495 ft. and plugged back to 9,482 ft. Top of the pay was called at 9,208 ft. Sinclair has staked location for a confirmation test 1,650 ft. west of the discovery, 2 Bess Henry, which has a projected depth of 10,000 ft.

A new oil pool is being opened in Newton County, 3 miles east of Gist field. Houston Oil Co. of Texas and American Republics Corp. B-2 Hankamer, HE&B RR Survey 16, A-932, flowed 180 bbl. of 37.7°-gravity oil daily through 9/64-in. choke. Production was through perforations at 7,225-26 ft. Tubing pressure was 1,150 psi.

Oil production has been opened in Tivoli field, Refugio County, at P. R. Rutherford, et al, J-1 P. H. Fagan. The well was potentialed for 110 bbl. of oil per day through 7/64-in. choke. Production is through perforations at 4,708-12 ft. Hole was drilled to total depth of 4,715 ft. and operator set 5½-in. casing on bottom. This well is located in James Fagan Survey, Abstract 27, and is ¼ mile west of gas production at Tivoli and ½ mile south of Fagan field oil production. However, the new oiler is shallower than the Fagan Ranch production.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Austin County: Oil discovery—Oil Drilling, Inc., 1 C. J. Marik, Randolph Von Roeder Sur., A-308, TD 3,051 ft., perf. 9,197-9,211 ft., IP: 159 bbl. oil per day, 10/64-in. choke, 35° gravity.

DeWitt County: Gas-condensate discovery—Rowan & Hope 1 Mary Henze, Jose Santos Sur., A-420, TD 7,614 ft., Slick

7,332-70 ft., IP: 12,000,000 cu. ft. of gas per day, open flow, and an ungaged amount of condensate, 56° gravity.

Fort Bend County: Oil discovery—Petroleum Management Co. 2 Robinson-Bashara, Hicks Shropshire Sur., A-313, TD 4,303 ft., perf. 4,146-50 ft., IP: 120 bbl. oil per day, 8/64-in. choke, 30.5° gravity.

Jackson County: New pay at Swan Lake—Southern Minerals Corp. 16 G. T. Brooking, Josiah H. Bell Sur., A-7, TD 8,699 ft., perf. 7,726-29 ft., IP: 145 bbl. oil per day, 7/64-in. choke, 43.3° gravity.

Jasper County: Oil discovery — American Republics Corp. and Houston Oil Co. of Texas 2 Salvador fee, Salvador Castillo League, A-6, TD 8,125 ft., perf. 6,987-90 ft., IP: 51 bbl. oil per day, 7/64-in. choke, 41.8° gravity.

Live Oak County: Oil discovery, "NE Goebel"—Sunray Oil Corp. 1 Otto W. Zamzow, Refugio County School Land Sur. 6, A-398, TD 7,252 ft., Wilcox 7,248-50 ft., IP: 115 bbl. oil per day, 7/64-in. choke, 29.2° gravity.

Refugio County: Oil discovery, "Tivoli"—P. R. Rutherford, et al, J-1 P. H. Fagan, James Fagan Sur., A-27 and Michael Reilly Sur., A-27, TD 4,715 ft., perf. 4,708-12 ft., IP: 110 bbl. oil per day, 7/64-in. choke, 24° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Chambers County: Commercial Petroleum & Transport Co. 1 G. C. Chambliss Unit, Chas. Wilcox Sur., A-303, dry, TD 8,814 ft.

Fayette County: Deep Rock Oil Corp. 1 Kelso-Swinea, G. Hernande Sur., A-215, dry, TD 2,330 ft.

Fort Bend County: Chas. B. Wrightsman 1 Mary Lipe Gamble, J. W. Scott Sur., A-321, dry, TD 8,036 ft.

Grimes County: E. G. Goforth, et al, 1 B. E. G. Goforth "B," William Berryman Sur. 16, A-228, dry, TD 7,602 ft.

Harris County: Brazos Oil & Gas Co. 1 Lockett, D. Simonton, et al, R. Hall Sur., A-349, dry, TD 8,254 ft.

Jefferson County: Jack Frazier and George & Herman Brown 1 Rothwell, et al, T&NO Sur., A-215, dry, TD 8,528 ft.

Karnes County: V. A. Brill 1 J. Olinick, Antonio Hernandez Grant, A-4, dry, TD 6,240 ft.

Orange County: Christensen & Matthews 1 C. A. Morgan, et al, Fisher & Henderson Sur., A-84, dry, TD 7,769 ft.

Wharton County: Adams & Haggarty 1 Selma Kainer, I&GN RR Sec. 25, A-243, dry, TD 5,906 ft.

A. W. Cherry, et al, 1 H. F. & C. D. Sellers, ET RR Sur., 15, A-145, dry, TD 5,815 ft.

NEW OIL HORIZONS

Announcement last week, in The Oil and Gas Journal, of recovery of commercially profitable oil from holes drilled into close, or closed, oil bearing sand, sandstone, or limestone, even after all of the usual salvaging attempt have failed, and even though the hole has already been shot, acidized, fractured, etc., with resulting sub-marginal production too small to pay to recover, or merely only a trace or trickle of oil and the well has been condemned by experts as commercially "dry"; primary recovery may be contracted on a contingent fee on result basis of only $1 per barrel, plus a modest mileage charge for moving of men and equipment.

Secondary recovery may also be contracted on the same contingent on result basis, whether only a single old producer which has been pumped dry of its presumably last barrel of profitable production, or for high speed stripping operations with the objective of wringing from the earth of the last drop of recoverable oil; or the rejuvenation of a whole field through the release of trapped marginal rock pressure and oil flow to bring back even fields already abandoned with casing and tubing pulled and wells plugged to even greater secondary recovery than the primary recovery already attained.

The ability of this corporation to undertake such recovery of oil is based upon development of new recovery procedure and processes of much greater efficiency and lower cost minimizing our risk and investment to such an extent that we can profitably contract on a contingent on result basis though a fixed fee may be arranged at customer's option where no participation in the results of recovery are desired, but basically it is our policy never to quote a fixed fee risk that we would not willingly ourselves underwrite.

Thus new horizons in the oil industry have been created with potential recovery of millions upon millions of barrels of oil, already economically abandoned, or on the point of abandonment, with the concurrent salvaging of millions of dollars in drilling investment already written off as lost.

Commencing with the primary and secondary recovery of oil from present wells other new horizons may soon become factual achievements in the availability on the same contingent on result basis of a new hydrogen atomic jet oil drill capable of drilling up to twenty thousand feet of depth at the rate of over two hundred feet per hour with a drilling cost of less than fifty cents per foot of depth; and an inert gas drill for directional lateral tunnelling of strata for tapping of oil concentrations inaccessible to vertical penetration.

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California

Strike Indicated Between Los Angeles County Fields

LOS ANGELES. — An oil discovery between the Del Valle and Newhall-Potrero fields in Los Angeles County is indicated by a formation test at 1 Newhall Land & Farming Co., Section 20-4n-17w, drilled by Southern California Petroleum Corp. Recovery of 35°-gravity oil from interval 8,893-8,978 ft. was in sufficient quantity to justify setting a 9,000-ft. string of casing, and a commercial producer is believed to be in prospect. The location is about ¾ mile south of Del Valle production and 1¼ miles northwest of the Newhall-Potrero field.

A second oil discovery of the week was Union Oil Co.'s 2 Rancho Ex-Mission Fee Corehole in Section 3-3n-23w, Ventura County, which was completed flowing 112 bbl. a day of 29.1°-gravity clean oil and 22,000 cu. ft. of gas through an 18/64-in. choke from about 3,150 ft. Location is 6 miles northeast of Ventura in one of the oldest producing areas of the state where a number of shallow discoveries were made around the turn of the century. Union's next prospect well in the area will be 3 Rancho Ex-Mission Fee Corehole in Section 10-3n-22w, 6 miles east of the discovery and about 5 miles west of the town of Santa Paula.

Of considerable importance is General Petroleum Corp.'s deeper-pool opener, 22 Tonner, in Brea-Olinda field in Orange County. On a drill-stem test of the interval 4,189-4,249 ft., with tester open 3 hours and 20 minutes and with a 523-ft. mud cushion, the well flowed at an indicated rate of 800 bbl. a day of 31°-gravity oil. Originally drilled to 8,789 ft., the well was redrilled to 4,249 ft. Operator is drilling ahead before completing.

Three new wildcats are scheduled for early spud in the Cuyama Valley, most interesting of which is Humble Oil & Refining Co.'s 1 Federal Sawyer, Section 28-32s-20e. Site for this test is about 2 miles northeast of recently discovered Taylor Canyon field, presently the farthest north production in the Valley. General Petroleum Corp., Standard Oil Co. of California, Hancock Oil Co., and Bandini Petroleum Co. hold acreage within a mile radius of the location.

In the Morales Canyon area, 2¾ miles south of the Humble location, Richfield Oil Corp. is preparing to drill 86-3 M. L. Howard in 3-11n-28w, which will be an attempt to extend the Morales Canyon-Superior pool to the north. Richfield has also made a location for a wildcat, the 64-14 Joice in 14-11n-28w, midway between Morales Canyon production and the north end of Russell Ranch field. The location is several hundred yards northeast of a minor Dibblee sand discovery made earlier this month by R. B. Watkins in 1 Luce.

Farther to the southeast in the Valley, Richfield has started work on a northerly extension test of the South Cuyama field. The well is 13-26 Heller in 26-10n-27w.

Oil showings in George Allen's Castaic area wildcat, 1 Allen in 19-5n-16w, 8 miles northwest of Honor Rancho field along the Ridge Route to Bakersfield, have prompted

the operator to move in heavier equipment to deepen from 1,802 ft. Present intention is to drill to about 3,400 ft.

CALIFORNIA SUCCESSFUL WILDCAT

Ventura County, new field discovery 12 miles west of Santa Paula and 6 miles northeast of the Ventura Avenue field: Union Oil Co. 2 Rancho Ex-Mission Fee Corehole, 3-3n-23w, flowed 112 bbl. daily, cut 0.1 per cent, 29.1°-gravity, 18/64-in. choke, perf. 3,027-3,110 ft., TD 3,171 ft.

CALIFORNIA UNSUCCESSFUL WILDCATS

Sutter County, Marysville area: D. D. Feldman Oil & Gas 1 Marysville Community One, 2-14n-3e, dry, TD 3,702 ft., elev. 60 ft.

Kern County, Comanche Point, southeast area: Cliff Zillgitt and J. H. McCue 1 Umphries, 33-12n-18w, dry, TD 1,065 ft., elev. 871 ft.

Salt Creek area: Gene Reid Drilling, Inc., 1 Westates, 24-29s-20e, dry, TD 1,300 ft., elev. 1,488 ft.

Spellacy anticline area: Independent Exploration Co., 14 T.I.O., 23-32s-23e, dry, TD 6,030 ft., elev. 1,441 ft.

Tejon Hills area: Harris Investment Corp. 2 Harris, 10-11n-18w, dry, TD 514 ft., elev. unknown.

Tunis Creek area: Standard Oil Co. of California, 16-21 Tejon Ranch 3, 21-11n-18w, dry, TD 2,750 ft., elev. 829 ft.

Tulare County, Lindsay area: Lindsay Community Development Association 3, 30-20s-27e, dry, TD 1,200 ft., elev. 378 ft.

Los Angeles County, Canoga Park area: Southern California Petroleum Corp., and R. E. Bering 1 Miller-Sanger, 34-2n-17w, dry, TD 2,425 ft., elev. 1,060 ft.

Canadian Fields

Royalite-Stony Plain Well Tests 1,400 Bbl. Light Oil

CALGARY.—The best oil well yet obtained on Indian Reserve lands in Canada was indicated when Royalite - Stony Plain 2 kicked off with a flush flow rate of over 1,400 bbl. daily of light crude oil. The well—either a D3 Devonian reef discovery, or an important extension of Acheson-Stony Plain reef field—will be followed up immediately by a northeast offset, on property owned 50-50 by Royalite Oil Co., Ltd., and Pan Western Oils, Ltd. The offset will be in LSD 10, 23-52-26w4, ¾ mile northeast of the producer.

Royalite-Stony 2, in LSD 6, 23-52-26w4, was swabbed in June 21. In a 30-minute flow test through about ½-in. choke, the well produced some 36 bbl. of oil. A later 6-hour flow test was completed through a 9 16-in. choke with recovery of 58 bbl. an hour. The well topped D3 reef at 5,040 ft. (2,689 ft. subsea), and set 7-in. casing as a protective measure when the highly porous top of D3 started taking drilling mud and caused lost circulation. This week, plus was drilled and hole cored to 5,068 ft. The mud-stealing formation caused further lost circulation, and brought about the decision to halt at current depth and take production. D3 top was logged about 88 ft. higher than the oil-water line at California - Standard's Acheson oil wells, which start 1½ miles to the north. The well also indicated possibilities of commercial oil production in D2 zone of the Devonian.

The new well is located on a spread of 1,440 acres of checkerboard quarter sections on the east half of the Stony Plain Indian Reserve, 8 miles southwest of Edmonton. These lands, and the well, are shared: 50 per cent by Royalite Oil Co., Ltd., and 1 per cent each by Oaseg Oil Ex-9 per cent by Mid-Continent Oil & Gas Co.,

(Continued on page 180)

Illinois-Ind.-Ky.

Edwards County Test Proves New Pay Zone

FRED BIPPUS and Paco Petroleum Co. are proving a new pay zone for the area 5 miles southwest of Albion, Edwards County, Illinois, where their 1 Woodham, NE NE NW 31-2s-10e, flowed at the rate of 35 to 37 bbl. of oil per hour from Rosiclare lime at 3,295-3,319 ft. The location is just south of production in the Mitchell pool, which produces from McClosky lime, and west of the Ellery South pool, which produces from McClosky lime and Aux Vases sand. The flow followed treatment of the pay zone with 2,000 gal. of acid.

One-half mile from production in the Sumpter area, 4 miles north of Carmi, White County, Illinois, Noah Petroleum Co. 1 Mary Winter, SW SE NW 25-4s-9e, yielded 480 ft. of clean oil in a drill-stem test of Tar Springs sand at 2,537-47 ft., and now has 5-in. casing run to 2,530 ft. for production test. Tester was open 60 minutes. Gas flowed in 42 minutes. Indicated bottom-hole pressure was 1,100 psi.

Indications of production have been given in a wildcat located 7 miles southwest of Flora, Clay County, Illinois. The wildcat, Ward W. Dayton 1 Campbell, SE NW SE 11-2n-5e, had promising oil showings in broken Cypress sand logged at 2,505-35 ft. Following a drill-stem test with tool open 2 hours there was 150 ft. of clean oil and 270 ft. of mud-cut oil in the pipe. Casing has been run to 2,498 ft. Location is 2½ miles southwest of production in the Kenner pool.

In western Kentucky, W. F. Lacy and George & Wrather Drilling Co. 1 Newton Heirs, SW SW SW 20-N-23, flowed 60 bbl. of oil with an estimated 11,000,000 cu. ft. of gas per day to open a new area a mile from other production in the area 3½ miles west of Sebree, Webster County. Production is from Hardinsburg sand at 2,010-20 ft.

Indiana Farm Bureau Cooperative Association 1 Reese, SE NW NW 18-6s-13, 1 mile north of production in the Farmersville pool, Posey County, southwestern Indiana, swabbed at the rate of 23 bbl. of oil per hour natural in initial tests, and now is being put on the pump for completion. Pay zone is O'Hara lime at 2,876-81 ft.

ILLINOIS SUCCESSFUL WILDCAT

Wabash County: Paul Rossi 1 Leitch, NW SE NW 23-1s-14w, IP 46 bbl., Rosiclare 2,933-37 ft., TD 3,004 ft.

ILLINOIS WILDCAT FAILURES

Clay County: Skiles Oil Corp. 1 Kenley, NE NE SE 36-4n-7e, dry, TD 3,065 ft.

Clinton County: E. J. Goldschmidt 1 Rakers, SW SW SW 18-2n-4w, dry, TD 3,120 ft.

Arnold Wilson Corp. 1 Walker, N½ SW NW 11-3n-2w, dry, TD 1,111 ft.

Gallatin County: George & Wrather 1 Johnson, NE NW SE 24-7s-8e, dry, TD 2,019 ft.

Hamilton County: Bolin & Appleby 1 Stitch, NE SE SW 31-3s-6e, dry, TD 3,430 ft.

A. J. Walker 1 Maulding, NW NW SE 28-4s-7e, dry, TD 3,554 ft.

Jefferson County: Don Baines 1 Taylor et al, SE SE NE 11-2s-3e, dry, TD 2,980 ft.

Marion County: S. D. Jarvis 1 Kuhn, SE SE NE 32-3n-1e, dry, TD 1,550 ft.

Richland County: Ryan Oil Co. 1 Chestnut, NE SE SE 19-3n-14w, dry, TD 3,330 ft.

Wabash County: T. M. Bane and Ryan & Sharp 1 Kingsbury, NE SE NE 33-2n-12w, dry, TD 2,510 ft.

(Continued on page 180)

Louisiana-Arkansas

Testing of Pettit Scheduled At Two Prospective Strikes

SHREVEPORT.—In Caddo Parish, North Louisiana, Burnham & Browning 1 Utz, prospective Pettit discovery in Section 14-19n-16w, is planning to run producing string and test at 5,511-39 ft. A drill-stem test of the interval 5,511-22 ft. recovered 130 ft. of oil and gas-cut mud with odor. Total depth is 5,964 ft. Operator may also test the upper Pettit from 5,422-48 ft. Closest Pettit production is in Longwood field, 4 miles southwest of the 1 Utz. Six miles to the north is Gulf Refining Co.'s recent Pettit strike in Caddo-Pine Island area, the 279-N Caddo Levee Board, 11-20n-16w, new pay zone for the field.

In Arkansas, Parham & Burnett Drilling Co. tested perforations in the Pettit at the 1 Curry, Columbia County wildcat, and had a slight show of oil and salt water at 3,717-26 ft. It was plugged back to 3,712 ft., and tested salt water from 3,690-96 ft. At last report the crew was squeezing. After

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recovering oil on a previous drill-stem test below 3,682 ft. (see field report, June 21 issue, page 389), operator set casing at 3,760 ft. The prospective discovery is located in Section 12-16s-20w.

In the same county, 29-19s-20w, Carter Oil Co. is drilling below 9,900 ft. at its deep venture, 1 McMertise School.

In North Louisiana, a new Tuscaloosa strike is indicated in Nachitoches Parish. S. S. Alexander 1 C. B. Barron, 7-13n-7w, flowed at the rate of 1,600,000 cu. ft. of gas plus some distillate from perforations at 3,170-73 ft. Flow was through ¼-in. choke; casing pressure was 1,390 psi; tubing pressure, 1,275 psi.; 5-in. casing is set on bottom 3,173 ft.

A rank wildcat in Grant Parish, Louisiana, is drilling below 2,000 ft. The well, Hurley, Cummings & Lohman 1 Colfax Lumber Co., 10-8n-5w, is about 4 miles northwest of a recent failure which had a slight oil show at 4,125-35 ft. The first well, Crow Drilling Co. 1 Colfax, 36-8n-5w, was dry at total depth of 4,510 ft.

State potential test at Southwest Gas Producing Co. and Feazel 1-A Petersen measured 198 bbl. of 23°-gravity oil, and the allowable for this new discovery has been set at 134 bbl. per day. The well is in Hico-Knowles field, 25-50n-4w, and is the first oil producer in Lincoln Parish (see same reference above).

NORTH LOUISIANA WILDCAT FAILURES

Concordia Parish: Fletcher et al 1 Forman, 660 ft. N and 1,090 ft. E SWc 25-6n-6e, dry, TD 7,024 f t.

DeSoto Parish: Lent et al 1 Ethridge, 728 ft. S and 62 ft. W NEc NW NE 7-10n-13w, dry, TD 1,848 ft.

LaSalle Parish: Michael et al 3 Nebo Oil Co. "G," C SE SW 21-8n-4e, dry, TD 4,510 ft.

ARKANSAS SUCCESSFUL WILDCAT

Union County: Kinard et al 1 Burns, SW NE SW 13-18s-17w, flowed 120 bbl. 39°-gravity oil from Smackover lime at 7,624-26 ft., TD 7,692 ft., new pay in E. Schuler field.

ARKANSAS WILDCAT FAILURE

Lafayette County: Bradham et al 1 Burton Bros., C SE SW 2-17s-23w, dry, TD 8,345 ft.

Appalachian-Ohio

Preston County Well Gets Good Gas Flow in Oriskany

PITTSBURGH.—In Garrett County, Maryland, work has been started at two new locations: Mid Atlantic Oil & Gas Co. 2 Grimes, rigging up, and Blaho Oil & Gas Co. 1 Dorcey Rumble, moving rig. Eberly & Snee 1 fee, elevation 2,447 ft., topped the Onondaga at 3,330 ft. and is shut down at 3,337 ft. to run casing. Blaho Oil & Gas Co. 1 Simon Cogley, elevation 2,420 ft., reached the Tully at 5,630 ft. and is shut down at 5,531 ft. New York State Natural Gas Corp. 1-N-225 Orville Kitzmiller, elevation 2,403 ft., is shut down at 3,903 ft. to case. The Onondaga was reached at 3,894 ft.

In Portland district, Preston County, West Virginia, Hope Natural Gas Co. 9636 Margaret C. Kraus is shut down at a depth of 5,361 ft. The gas first encountered at a depth of 5,250 ft. in the Oriskany sand now tests 1,800,000 cu. ft. in the continuation of drilling. Trap Hill district, Raleigh County, Hope Natural Gas Co. 9626 Paul Trump, gaged 1,565,000 cu. ft. of gas in Maxon sand, total depth 1,990 ft.

In North Central Pennsylvania, Godfrey L. Cabot, Inc., completed 1 Florence Wykoff in Leidy Township, Clinton County, as a dry hole. Onondaga was called at 6,723 ft., Oriskany sand at 6,746 ft., and total depth was 6,793 ft. C. E. Fralich has located 4 and 5 on Tract 5, State of Pennsylvania Lands. Acme Drilling Co. located 1 Florence Wykoff. In Abbot Township, Potter County, Dorcie Calhoun located 1 Frank Secour. Eberly & Snee located 1 Regina Roach in the Boro of Driftwood, Cameron County. One new location was made in southwestern Pennsylvania, Washington Township, Indiana County.

OHIO

COLUMBUS.—C. R. Obermiller added a ½-mile extension to Canaan gas pool with a well on 1 J. M. Steele, Lot 30, Westfield Township, Medina County. The Clinton sand was reported at 2,987-98 ft. with 1,100,000 cu. ft. of gas natural.

Ohio Fuel 1 C. M. Kettering, Section 30, Knox Township, Holmes County, logged the Oriskany at 1,850-2,023 ft. with 200,000 cu. ft. of gas, and the Newburg at 2,405-48 ft. with 200,000 cu. ft. natural. The Newburg was shot and gaged 1,425,000 cu. ft. when tubed and shut in.

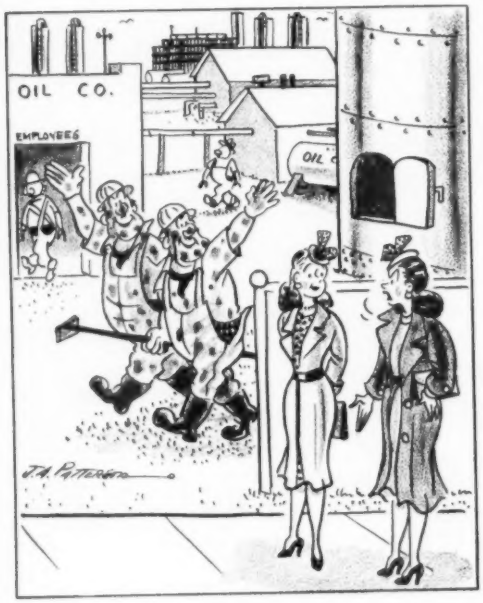
Two oil producers were completed in the Ashland County Berea sand field, both in Perry Township.

Everett Waltz 1 H. E. Garn, Section 26, made 20 bbl. after shot, with sand at 563-684 ft. Harry McClellan 5 Paul Funk, Section 26, made 50 bbl. after shot, with sand at 511-96 ft.

In New Castle Township, Coshocton County, two additional wells were completed. Pure Oil 2 Clifford Daliere, third quarter, was shot with 60 qt. and made 55 bbl. in 24 hours. Willard Shrider 2 Paul Funk, third quarter, showed 5 bbl. natural, in the Clinton, found at 3,296-3,352 ft., and made 60 bbl. in 24 hours after a 120-qt. shot.

OHIO SUCCESSFUL WILDCAT

Perry County, Bearfield Township: Ohio Fuel Gas Co. 1 A. W. Paskell, Sec. 17, Clinton 3,548-83 ft., 210,000 cu. ft. gas, TD 3,675 ft.



THE OIL AND GAS JOURNAL

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Petroleum Industry Consultants, C. A., Caracas, Venez.

Denton-Spencer Co., Ltd., Calgary, Alberta, Canada.

OHIO WILDCAT FAILURE

Richland County, Washington Township: H. E. Perkins 1 Fred Lanehart, Sec. 34, dry, TD 2,660 ft.

Permian Basin

Spraberry Fields of Midland, Glasscock Counties Linked

MIDLAND.—Drilling in the West Texas fields was holding a high pace; several discoveries were in the completion stage; and there were Spraberry extensions, a connecting link between the Spraberry fields of Midland and Glasscock counties, and a new Spraberry discovery in Reagan County.

About 3 miles south of Midland, Moore Exploration Co. 1 A. R. Baumann, 14-38-2S-T&P, tentatively identified as producing from a zone in the lower Pennsylvanian, was completed for 226 bbl. of 48°-gravity oil a day flowing through ⅛-in. tubing choke. Completion was without acid, in open hole between 11,284-93 ft., total depth.

The same operators were to begin immediately on an offset approximately 1 mile to the southeast in the NE NE section 24 in same block. The second well is to be the 1 Dowlen-Houpt, which will try for production from the same formation, on a 11,300-ft. contract.

Northwestern Reagan County received a third Spraberry discovery at Paul F. Barnhart 1-15 G. S. Wimberly, which flowed 176 bbl. of oil a day through 20/64-in. choke, from pay at 6,795-6,900 ft. The two other discoveries in the area were Texas Crude Co. 1-40 Proctor and Sunray Oil Corp. 1-A Sherrod.

Sohio Petroleum Co. 1 Boone, 42-36-2S-T&P, in the undrilled area between Tex Harvey and Germania fields, was seen as a connecting link. Top of the Sraberry was 7,038 ft. on elevation of 2,618 ft., and at total depth of 7,096 ft. there was 3,500 ft. of oil in the hole. Operators set casing at 7,005 ft. and prepared to test without acid.

Gulf Oil Corp. 2-B-P-SI-Glass, Martin County Pennsylvanian discovery, prepared to make a dual completion and was testing in the Silurian. Perforations at 12,100-80 ft. developed a flow of 55 bbl. of 43°-gravity oil and 5 bbl. of sediment and water after acid treatment.

Tide Water Associated Oil Co. 1 Dickenson, wildcat west of Stanton which developed oil on a drill-stem test at 11,740-80 ft. and had further oil shows in a core from 11,785-92 ft., recovered some gas-cut mud and over 11,000 ft. of salt water with no shows.

North of Stanton, Deep Rock Oil Corp. 1 McWhortor recovered 600 ft. of drilling fluid with no shows from 7,240-90 ft. and was drilling ahead.

Pan American Producing Co. 1 Breedlove, deep wildcat northwest of Tarzan, started coring at 12,663 ft. in the Montoya section and was at 12,696 ft. at last report.

East of the Shafter Lake field in Andrews County, Cities Service Oil Co. and Sinclair Oil & Gas Co. 1-B Reed recovered water blanket which had a slight show of oil, and 180 ft. of heavily oil and gas-cut mud from top of the Devonian at 10,814-70 ft. It was to drill ahead 50 ft. and test again. Top of the Devonian was 10,820 ft., or minus 7,704 ft.

Superior Oil Co. and Intex Oil Co. have completed their 15-535 Wallace H. Jones, northeast Borden County, as a discovery in what has been tentatively identified as the Mississippian. Data on the wildcat was not released while drilling.

On completion potential, the well flowed 293 bbl. of 41°-gravity oil a day through 16/64-in. choke with no water. Completion was without acid from open hole at 8,175-95 ft. Location is about 2 miles southwest of the one-well Winfield pool, drilled in 1949 by Superior which had some production in the Mississippian around 8,200 ft.

In Yoakum County, Star Oil Co. 1-A Taylor was drilling limestone at 12,097 ft. Continental Oil Co. 1 Pierson was drilling lime at 11,030 ft., and General American Oil Co. 1 Richmond was drilling below 10,570 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCAT

Midland County: Atlantic Refining Co. 1 J. W. Driver, 16-37-TUP, TD 7,317 ft., elev. 2,711 ft., Spraberry 7,090 ft., pay 7,111 ft., IP flowed 163 bbl. 35°-gravity oil a day, ½-in. choke, TP 20 psi.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURE

Runnels County: Harrison & Rasnick 2 D. E. Pinegar, 10-J-BBB&C, dry, TD 4,572 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Roosevelt County had one drilling well reported, one location and one digging cellar and pits.

The drilling operation was Mid-Continent Oil Co. 1 Strickland-Dorn, 9-4s-35e, which was below 7,582 ft. in shale of unidentified age.

George P. Livermore, Inc. 1 D. O. Bilberry, 1-7s-37e, was digging cellar and pits, and Lynn Greer 1 N. G. Vinther, 14-3s-30e, had location made for a 4,000-ft. test.

Continental Oil Co. 1-B-27 Warren Unit, wildcat in 27-20s-38e, Lea County, had swabbed 122 bbl. of fluid in 5 hours after perforating at 6,868-82 ft. Oil content in the fluid, if any, was not disclosed.

On the west side of the Bough Pennsylvanian field, Magnolia Petroleum Co. 2-B Betenbaugh was drilling limestone below 11,513 ft. It is an Ellenburger test.

Spartan Drilling Co. completed its 1 Turner as a Yates sand discovery in 13-20s-33e. The well made pumping potential of 56.84 bbl. of oil from pay at 3,255-3,325 ft.

Skelly Oil Co. 1 State "J," 32-24s-38e, recovered 300 ft. of gas-cut mud and 300 ft. of heavily oil-cut mud on a drill-stem test at 6,732-6,875 ft. Drilling continued below 7,240 ft. on an 8,500-ft. contract.

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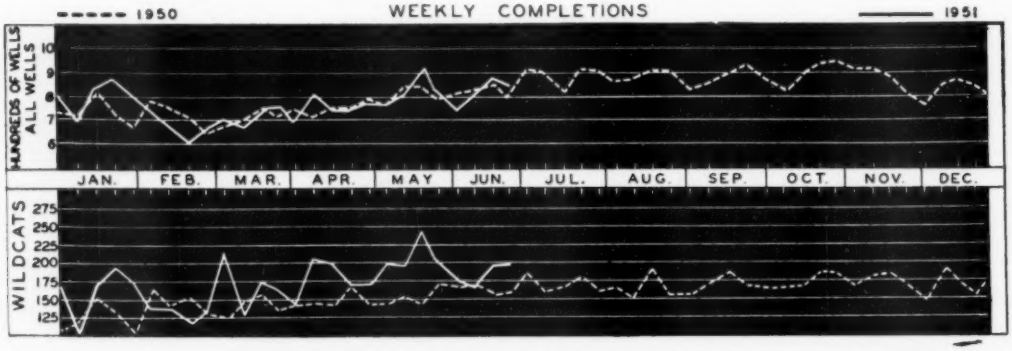
CURRENT STATISTICS

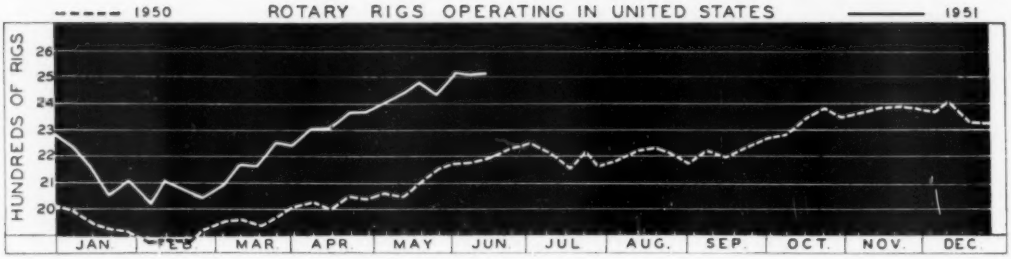
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 23, 1951

	Total of all wells					June 23		Wildcat completions and discoveries					Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	9	5	0	*4	10,341	215	228	0	0	0	0	0	0	0	0	0	0
Pennsylvania	13	5	3	*5	22,626	343	452	0	0	0	0	0	0	0	0	1	1
West Virginia	7	1	5	1	19,312	260	312	0	0	0	0	0	0	0	5	3	8
Ohio	23	12	5	†6	45,938	403	455	0	0	1	1	2	1	0	4	14	19
Indiana	38	18	0	20	67,680	506	652	1	0	0	10	11	13	0	1	129	143
Kentucky	33	26	0	7	46,160	497	441	3	0	0	4	7	9	0	1	94	104
Illinois	51	12	0	39	148,255	918	1,165	1	0	0	18	19	21	0	0	190	211
Michigan	16	3	0	†13	39,276	336	393	1	0	0	8	9	13	0	5	134	152
Kansas	112	64	8	§40	374,078	1,988	1,703	11	0	0	20	31	104	0	8	386	498
Nebraska	6	2	1	3	25,295	126	44	0	0	0	2	2	4	0	1	56	61
Oklahoma	84	49	4	§31	315,188	2,646	2,475	3	0	0	9	12	95	2	14	340	451
Texas	293	176	15	102	1,255,782	7,710	7,536	19	2	1	56	78	345	30	52	1,507	1,934
North Central (Dist. 7-B & 9)	108	57	0	†51	335,196	2,388	2,366	9	1	0	27	37	171	2	8	652	833
West (Dist. 7-C & 8)	37	36	0	1	204,166	2,310	2,137	1	0	0	1	2	*74	8	4	*284	370
Panhandle (Dist. 10)	19	11	7	1	57,215	328	455	0	0	0	0	0	1	0	0	11	12
Eastern (Dist. 5 & 6)	21	11	0	10	92,373	562	553	0	0	0	3	3	4	4	0	105	113
Gulf Coast (Dist. 2 & 3)	50	31	3	16	291,548	1,075	1,047	6	1	0	10	17	50	12	31	218	311
Southwest (Dist. 1 & 4)	58	30	5	23	275,284	1,047	976	3	0	1	15	19	45	4	9	237	295
Louisiana	46	26	4	16	252,726	958	1,158	1	1	0	3	5	22	3	4	119	148
Northern	28	14	4	10	92,229	*488	602	0	0	0	3	3	*6	0	3	*67	76
Southern	18	12	0	6	160,497	470	556	1	1	0	0	2	16	3	1	52	72
Arkansas	8	4	0	4	35,219	182	186	1	0	0	1	2	8	0	1	33	42
Mississippi	11	7	1	3	79,869	140	158	0	0	0	2	2	6	3	0	50	59
Southeastern States	0	0	0	0	0	34	29	0	0	0	0	0	0	0	0	13	13
Montana	1	0	0	1	7,946	106	90	0	0	0	1	1	0	0	0	25	25
Wyoming	14	10	0	4	56,812	321	264	0	0	0	2	2	7	0	0	47	54
Colorado-Utah	7	2	0	5	36,419	120	37	1	0	0	4	5	4	0	3	58	65
New Mexico	21	8	10	3	111,631	311	311	0	0	1	0	1	8	0	6	36	50
California	51	37	0	14	157,053	1,027	801	1	0	0	8	9	22	0	1	198	221
Miscellaneous	0	0	0	0	0	22	8	0	0	0	0	0	0	0	13	8	21
Total United States	844	467	56	321	3,107,606	19,169	18,398	43	3	3	149	198	682	38	119	3,441	4,280
Total previous week	882	488	47	347	3,284,727	(*)		*35	1	3	*158	197	*639	35	116	*3,292	*4,082
Total June 23, 1950	800	480	43	277	2,897,556			26	1	2	124	153	485	33	96	2,817	3,431

Service wells included: *4, †2, ‡1, §5. *Revised.





DAILY AVERAGE PRODUCTION FOR WEEK

	June 23 crude oil	B. of M. June demand	June 16 crude oil
Alabama	3,000	2,400	3,000
Arkansas	78,300	85,000	78,300
California	967,500	976,000	968,500
Colorado	73,200	79,000	71,700
Eastern	60,000	64,000	59,900
Florida	1,800	1,600	1,650
Illinois	168,100	163,000	168,000
Indiana	29,700	29,000	29,900
Kansas	322,350	311,000	309,450
Kentucky	27,600	29,000	27,900
Louisiana	614,500	638,000	615,200
North Louisiana	115,850		116,550
South Louisiana	498,630		498,650
Michigan	39,600	42,000	38,500
Mississippi	101,750	104,000	100,450
Montana	23,500	24,000	23,100
Nebraska	7,150	10,000	7,200
New Mexico	143,075	142,000	143,075
Oklahoma	505,900	515,000	505,600
Texas	2,754,175	2,500,000	2,754,175
Dist. 1 (Southwest)	32,925		32,925
Dist. 4 (Southwest)	258,025		258,025
Dist. 2 (Gulf Coast)	159,750		159,750
Dist. 3 (Gulf Coast)	480,075		480,075
Dist. 5 (Eastern)	53,425		53,425
Dist. 6 (Eastern)	113,950		113,950
East Texas field	281,500		281,500
Dist. 7-C (West)	99,325		99,325
Dist. 8 (West)	941,125		941,125
Dist. 7-B (W. Central)	87,075		87,075
Dist. 9 (N. Central)	158,400		158,400
Dist. 10 (Panhandle)	88,600		88,600
Utah	3,800	5,000	3,900
Wyoming	194,500	180,000	192,600
Total United States	*6,119,500	5,900,000	6,102,100
Change from previous week, up	17,400		
Canada	170,000		168,725

Total U. S. production January 1-June 23 ‡1,004,892,590 bbl.
Same period last year (crude plus cond.) 878,548,600 bbl.

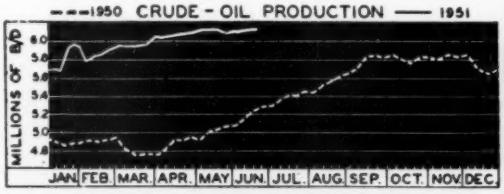
*Not including 103,845 bbl. condensate. ‡Including 18,610,025 bbl. condensate.

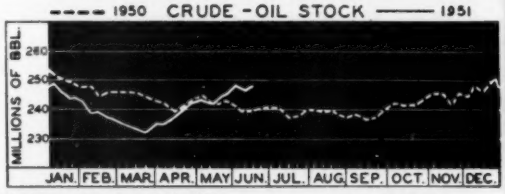
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

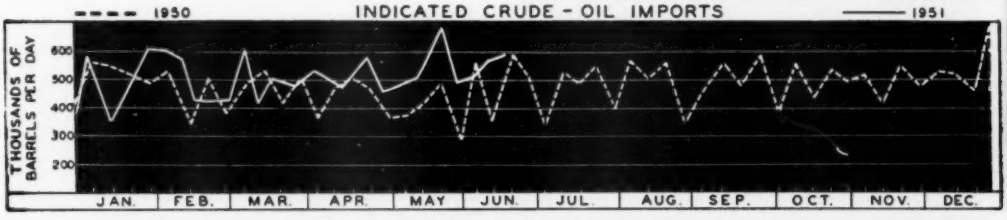
(Thousands of barrels)

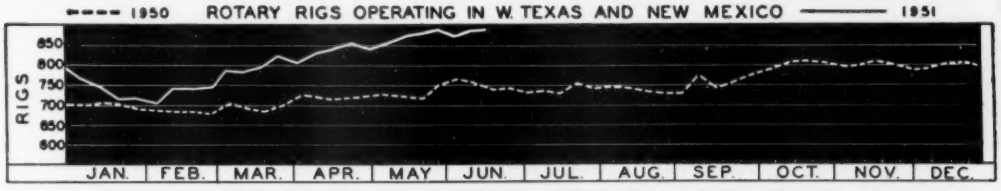
	June 16, 1951	June 9, 1951	June 17, 1950
Pennsylvania Grade	2,115	2,094	2,916
Other Appalachian	1,539	1,610	1,582
Illinois, Indiana, Michigan	10,984	10,891	9,400
Arkansas	2,765	2,731	2,777
Louisiana	14,525	14,336	15,332
North	3,091	3,039	3,362
Gulf	11,434	11,297	11,970
Mississippi	3,200	3,270	2,326
New Mexico	6,637	6,639	6,073
Oklahoma and Kansas	38,091	38,293	33,955
Texas	115,645	114,387	110,683
East Texas	15,285	15,025	15,749
West Texas	47,457	46,188	40,427
Texas Gulf	25,182	24,989	26,738
Other Texas	27,721	28,185	27,769
Rocky Mountain	14,241	14,255	12,550
California	30,566	30,270	35,492
Foreign	8,256	7,881	6,776
Total	248,566	246,660	239,862

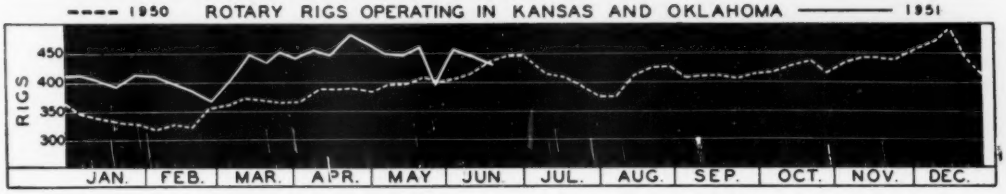
*Bureau of Mines.









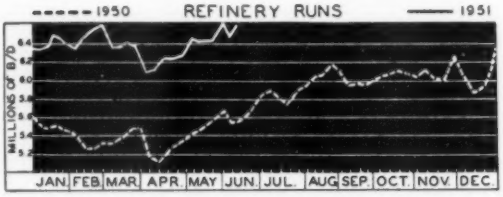


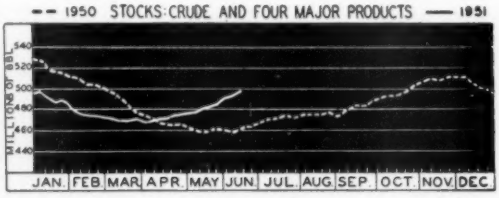
A.P.I. REFINERY REPORT, JUNE 16

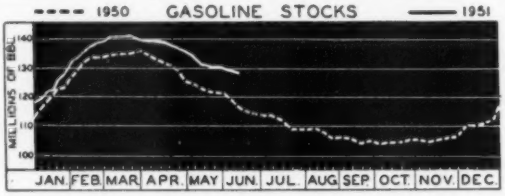
(Thousands of barrels)

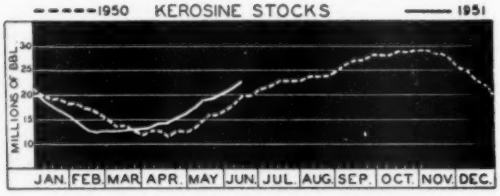
District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, June 1950				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,071	390.7	48.4	221.3	234.4	27,520	9,222	18,237	9,261	924	399.9	33.7	183.3	187.5
Appalachian:														
District 1	103	49.1	6.7	18.4	12.3	2,898	482	620	425	92	42.7	4.4	11.8	8.2
District 2	81	39.4	1.1	6.2	14.4	1,472	183	347	226	71	33.1	2.1	9.4	13.5
Ind., Ill., Ky.	1,194	632.2	67.8	192.2	151.2	28,397	4,215	12,471	3,870	1,042	564.2	63.5	156.0	142.6
Okla., Kans., Mo.	548	292.0	21.9	119.4	66.7	14,314	1,255	6,678	1,279	502	273.3	16.1	104.3	59.6
Inland Texas	252	173.7	12.9	46.6	47.1	3,399	404	1,097	806	209	133.5	10.3	28.8	43.6
Texas Gulf Coast	1,624	748.4	119.0	302.4	272.2	19,561	3,935	7,393	4,635	1,189	561.2	88.0	246.1	209.1
La. Gulf Coast	496	243.4	52.9	121.7	70.4	6,757	2,165	3,491	1,888	456	224.7	44.0	100.5	59.4
N. La. and Ark.	77	29.9	8.1	18.0	7.3	2,571	415	722	81	68	25.2	5.9	14.0	10.2
Rocky Mountain:														
New Mexico	13	7.6		2.7	2.7	98		58	32	14	7.6	0.4	2.3	3.8
Other Rocky Mtn.	236	106.3	4.9	42.4	48.6	5,368	260	1,391	887	197	85.9	4.2	36.5	35.0
California	893	415.2	20.3	127.4	382.6	16,112	479	7,769	16,269	891	397.0	10.0	144.0	296.1
June 16, 1951	6,588	3,127.9	364.0	1,218.7	1,309.9	128,467	23,015	60,274	39,659	5,655	2,748.3	282.6	1,037.0	1,068.6
June 9, 1951	6,478	3,032.4	331.4	1,239.7	1,274.4	129,353	21,890	57,372	38,839					
June 17, 1950	5,565	2,719.1	290.4	1,009.3	1,066.7	116,374	19,507	47,717	40,740					

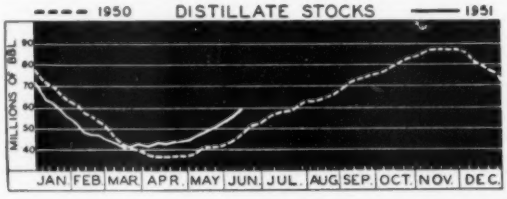
*At refineries including natural blended. †Finished and unfinished.

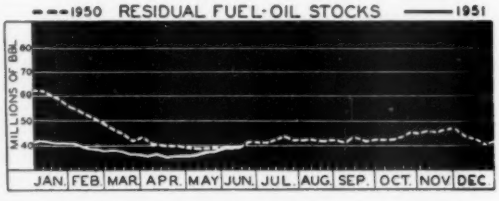


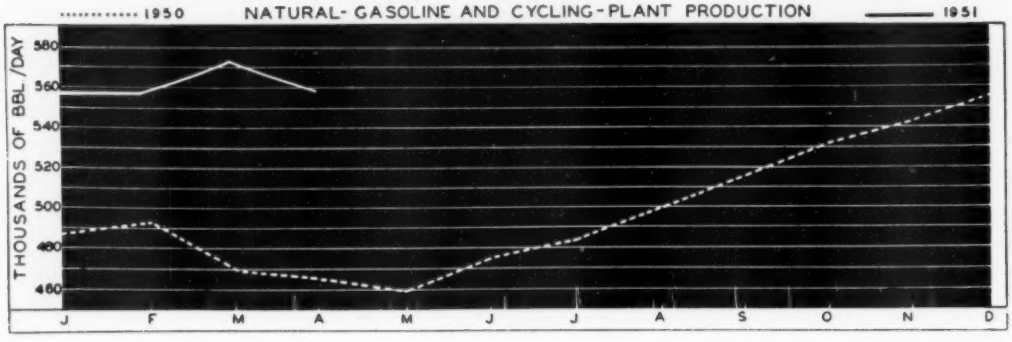












CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6 1947.

‡Standard Oil Co. of California

FLAT CRUDE PRICES

Representative posted schedules per barrel	
East Texas†	$2.65
Kettleman Hills, California*	2.30
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

FOR all areas east of California, indicated demand for refinery-produced gasoline is showing a smaller percentage gain over last year than for the other major products. Even though rapid increases in demand in June of 1950 account for part of the poor comparative showing this year, some suppliers feel that this season's demand to date has been a little disappointing.

Refinery production of gasoline in areas east of California for the 3 weeks ended June 16 was 12.8 per cent greater than in the same weeks last year, but stock withdrawals this year were only 1,965,000 bbl. compared with 5,717,000 bbl. for the same weeks in 1950. Production reached an all-time high for the week ended June 16. This was due to peak refinery runs and not to any increase in percentage yield.

Total gasoline stocks east of California are 13,701,000 bbl. or 13.9 per cent greater than at this time last year compared with an increase in indicated demand of 4.6 per cent for the 3 weeks ended June 16.

In the Mid-Continent area, marketers reported the continued availability of gasoline in the pipe line, but at least one of the suppliers admitted that he could be in the market for material by the end of July if demand reaches the forecast level. Some additional strength was reported for kerosine and distillate fuels, indicating movement of these products to resellers for storage. If these home-heating fuels can be moved to consumer storage, primary demands will prevent abnormal increase in reported stocks for July.

However, the movement to resellers was not started soon enough to cut stock increases for the first half of June. The gain in primary kerosine stocks east of California for the 3-week period ended June 16 represented 48 per cent of total production in the period. Increases in distillate stocks accounted for 38 per cent of production.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of June 25, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	9-9⅜	10	8½-9
No. 2 straw fuel oil	8-8⅜	9	7½-8
No. 6 residual	$1.75-1.80	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

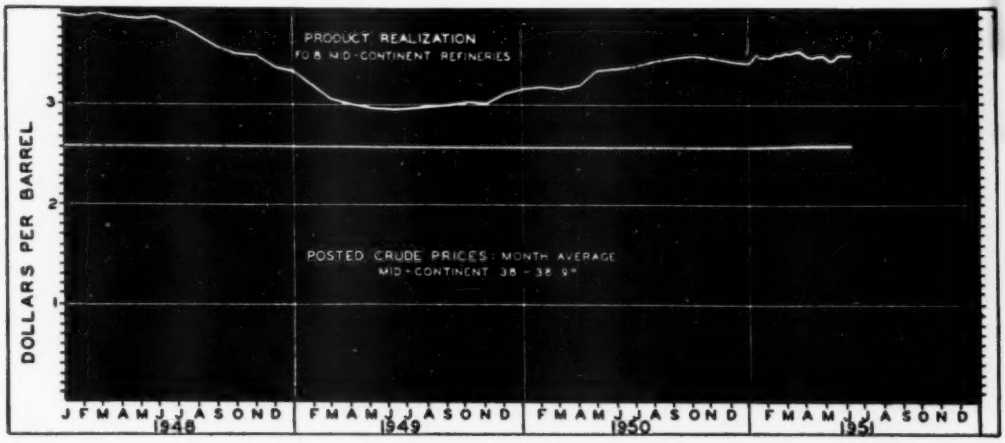
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	33.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	6.9



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.50 for week ended June 16, $3.49 for previous week, and $3.39 for June 1950.

May Hits Year's Peak in Wells, Footage, and Active Drilling Rigs

by Polly DeArmond

MAY was the month of records in drilling operations for the current year. More new wells were completed than during any other month in 1951, with an accompanying peak in footage drilled, and the number of active rigs at the end of the month was the highest for the past several years.

Excluding 123 holes drilled as input, storage, or disposal wells, operators completed 3,813 wells, of which 2,321 (or 60.7 per cent) were successful in finding oil or gas. Average footage per well jumped to 3,889 ft., and the 15,326,856 ft. drilled in May was the highest for any month in the postwar years.

Projected Totals

An analysis of operations for the past 6 years reveals that completions from January through May of any year average more than one-third of the total annual tabulation. In 1945, the 5-month cumulative figure was 33 per cent of the year's total; in 1946, it was 38.7 per cent; 1947, 37.1 per cent; 1948, 36.7 per cent; 1949, 38.6 per cent; 1950, 37.3 per cent. Footage for the same period is generally a little more than 40 per cent of the grand total.

If these rough yardsticks are used to arrive at an early estimate of activity for 1951, some 45,000 wells and 163,000,000 ft. will be drilled. These projected figures substantiate the all-time record-breaking forecasts made in The Oil and Gas Journal's review and forecast number of January 25, 1951, although they would be 1,157 wells and 366,000 ft. more than the estimates in that forecast. However, future economic trends and supply difficulties may result in this year's 5-month figures totaling higher than previous cumulative percentages.

1951 vs. 1950

Cumulative completions and footage remain ahead of the previous year's records. The number of wells completed so far this year increased by 574, or 3.5 per cent, over the first 5 months of 1950. Footage was up 5,541,235 ft., or 9.3 per cent.

It is interesting to note that completions during May have been the peak for the first 5 months of the year since 1947. Wells drilled for May this year compared with the record month of last year showed an increase of 463, or 13.3 per cent, while footage was up 2,873,987 ft., or 23.1 per cent.

SUMMARY OF COMPLETIONS . . . MAY 1951

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	62	31	0	31	62	0	0	0	0	0	86,986	50
Pennsylvania	140	71	8	61	132	8	0	0	0	0	229,381	200
West Virginia	50	7	27	16	20	29	1	0	0	0	153,443	176
Maryland	3	0	3	0	0	3	0	0	0	0	10,635	26
Ohio	68	21	18	29	41	27	0	0	0	0	137,927	145
Kentucky	125	48	11	66	105	20	0	0	0	0	226,363	106
Illinois	223	72	0	151	86	137	0	0	0	0	561,260	267
Indiana	91	25	0	66	74	17	0	0	0	0	156,185	224
Michigan	56	12	2	42	30	25	1	0	0	0	143,605	124
Kansas	389	185	38	166	55	330	4	0	0	0	1,377,367	430
Neb., Mo., Iowa	17	10	1	6	1	13	3	0	0	0	74,179	24
Oklahoma	507	269	27	211	144	263	67	17	16	0	1,814,509	811
Texas	1,617	968	70	579	407	583	419	152	39	12	7,351,653	1,797
North	300	155	2	143	121	139	40	0	0	0	936,290	333
West Central	220	85	5	130	104	88	28	0	0	0	656,455	210
West	492	389	3	100	90	129	199	46	20	8	2,630,860	611
Panhandle	65	32	25	8	5	59	0	1	0	0	201,940	119
East	109	63	2	44	21	44	27	13	2	2	518,703	81
Gulf Coast	226	135	18	73	23	67	57	62	15	2	1,411,793	247
Southwest	205	109	15	81	43	62	68	30	2	0	995,612	196
Louisiana	161	82	13	66	20	48	24	26	36	7	1,038,603	281
Northern	81	36	10	35	18	37	14	9	3	0	320,589	126
Southern	80	46	3	31	2	11	10	17	33	7	718,014	155
Arkansas	27	19	0	8	8	14	3	2	0	0	95,678	38
Mississippi	41	16	5	20	0	3	22	12	3	1	298,061	30
Ala., Ga., Fla.	8	4	0	4	0	2	5	1	0	0	43,101	4
Tennessee	7	2	1	4	6	1	0	0	0	0	9,035	8
Montana	13	7	0	6	8	5	0	0	0	0	29,428	58
Wyoming	45	29	2	14	2	26	13	4	0	0	219,934	199
Colorado	14	7	1	6	0	5	9	0	0	0	67,752	67
Utah	1	0	0	1	0	0	0	0	0	1	12,518	26
Dakotas	0	0	0	0	0	0	0	0	0	0	0	18
New Mexico	57	27	14	16	14	27	3	9	4	0	258,104	139
Nevada	1	0	0	1	0	0	1	0	0	0	5,117	3
California	218	165	3	50	70	83	32	21	11	1	925,969	252
Total May 1951	3,941	‡2,077	244	*1,620	1,285	1,674	607	244	109	22	15,326,856	†5,493
Total April 1951	3,245	1,770	144	1,331	1,125	1,345	514	169	76	16	12,227,597	5,275
Total May 1950	3,478	1,974	22	1,252	1,307	1,397	494	187	84	9	12,452,869	4,874
Cumulative 1951	16,720	9,177	1,055	6,488	5,347	7,089	2,732	1,001	472	79	65,427,849	
Cumulative 1950	16,146	9,359	839	5,718	5,877	6,384	2,602	854	375	54	59,786,615	
Alberta, Canada	91	60	12	19	7	47	35	2	0	0	392,479	124
Cumulative 1951	418	§300	23	95	25	219	165	9	0	0	1,800,032	
Cumulative 1950	338	250	15	73	16	222	95	5	0	0	1,344,891	

*Including 123 service wells. N. Y. 31, Pa. 59, Ohio 6, Ill. 1, Ind. 1, Mich. 1, Kans. 4, Okla. 11, No. Tex. 5, W. Cent. Tex. 1, Tex. Pan. 1, Tex. Gulf 1, S.W. Tex. 1. ‡Including 42 condensate wells: Okla. 8, W. Tex. 7, E. Tex. 6, Tex. Gulf 7, S.W. Tex. 3, No. La. 3, So. La. 6, Miss. 2. Canada incl. 1 condensate. †Including all wells rigged up and or drilling at month end. §Including 1 Idaho rig.

EQUIPMENT MEN . . . in the News

National Tank Holds Annual Meeting in Tulsa

The annual meeting of National Tank Co. held May 17-19 in Tulsa was attended by engineers, managers, and key men from the company's 39 field branches.

These branches cover 14 oil-producing states in the United States and the Province of Alberta, Canada. In addition, about 40 of National's Tulsa personnel representing management, engineering, sales, manufacturing, and distribution attended the meeting.

The program included a review of National's first 25 years of service to the industry, and the awarding of service pins. F. W. Baker, Merle Bryan, Jay P. Walker, Cecil G. Wells, and Joe Marshall received 25-year pins; Spider Allen, Charles Purser, Lloyd Taylor, and Joe Wells received 15-year pins; and Charles Lavery, Kenneth Shank, Wayne Snow, and Noel Webster received 10-year pins.

From National's field branches, attending its recent meeting were: Kneeling, Ed deYoung, Herb Walker, Bill Little, Charlie Purser, Bill Todd, Lynn Burrus, Reed Speir, and Red Brinkley; second row: Lloyd Conley, Neely Lowrie, George Steinhous, Les Lamb, Dick Brooks, Sam Mays, George Powers, Johnny Shelton, Dud Lowrie, Ward Guin, Jack Godwin, Rex Williams, Tracy Smith, Jack Williams, Jim Tallant, Martin Smith, and Sherman Barclay; back row: Earl Keck, L. M. Jewett, Harold Jones, Bill Willis, Joe Wells, Merle Bryan, S. S. Parker, Cliff Hill, Marvin Willis, Floyd Senter, Joe Marshall, Chester Immel, Jim Brown, and Ed Fontaine.

Jordan Is Made General Manager for World Supply

Harold Jordan, formerly of Thomas P. Pike Drilling Co., Los Angeles and Long Beach, Calif., has been appointed general manager of World Supply Co., Long Beach.

Jordan joined Pike Drilling in 1939. He advanced steadily in the organization until he was made assistant to the vice president in charge of drilling operations until his present change.

World Supply engages in the rental of oil-well tools, new drill pipe, drill collars, and power pumps.

Chapman Elected President Of Carver Pump Co.

Gordon L. Chapman was recently elected president of Carver Pump Co., Muscatine, Iowa, and Roy J. Carver, founder of the company, was elevated to chairman of the board.

Chapman joined Carver in 1948 as comptroller and in July of that year was elected vice president and a director. He spent several years with Touche, Niven, Bailey & Smart, public accountants, before joining Carver.

Carver also has announced the election of Alexander A. Zuber, plant manager, as a vice president and a director.

Rockwell Names Bledsoe To Engineering Post

P. C. Kreuch, Chicago district manager for Rockwell Manufacturing Co., has announced appointment of George G. Bledsoe as sales engineer of industrial accounts in the Chicago area.

G. G. BLEDSOE

Bledsoe received a B. S. degree in general business from Akron University in 1947. Prior to his affiliation with Rockwell, he served as sales promotional representative for Pittsburgh Valve & Fittings Corp. in West Virginia, Wisconsin, Minnesota, and Upper Michigan.

Price Made Pacific Coast District Manager

A. W. Coleman, general sales manager of Manning, Maxwell & Moore, Inc., advises that Edwin H. Price has been made Pacific Coast district manager succeeding Newton P. Selover, who becomes director of export planning. His headquarters will be in Los Angeles.

Price, a graduate of Columbia University, obtaining an M. S. degree in engineering, joined Manning, Maxwell & Moore in 1930.

Calumet & Hecla Enters Steel Tubing Field

Wolverine Tube Division of Calumet & Hecla Consolidated Copper Co. has expanded into the field of steel tubing. An agreement has been concluded between Calumet & Hecla and Karmazin Products Corp., of Wyandotte, Mich., whereby Wolverine Tube Division has exclusive rights to produce tubes by the patented forming and brazing processes of Karmazin.

This expansion will enable Wolverine to manufacture brazed tubes of both ferrous and nonferrous metals.

(Continued on page 181)

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L. C. MOORE 75 ft. 3½ Tubular derrick, 20-ft. 10-in. base, angle iron girts and braces, single crown block, sand shieve steel bull and band wheels, friction sand reel, 100 hp. Buffalo drilling engine with reverse clutch and brake. String of tools if desired. Reasonable price for immediate sale. Reserve Gas Co., 3060 Bailey Avenue, Buffalo 15, N. Y.

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2½ to 25 Kw Light Plants, Byron Jackson Pump Units, Gaso Pump Units, Hale Fire Pump Units, Stewart-Warner Heater Units, Benson Portable Power Hoist, Victaulic Pipe Couplings & Fittings, Mobilift Forklift Trucks, New Wheatley 4" & 6" Gate Valves 500 WP. Write for listing—H. A. McCarthy, 310 Thompson Bldg., Tulsa, Oklahoma. 5-3296.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

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FOR SALE

Six 125 H.P. Horizontal Clark Engines, Overhead Exhaust. Connected with 3—7¼ X 20 Compressors. Connected with 3—17 X 20 Low Compressors. The best repressure engines on the market for economy and dependability. Located 7 Miles Northeast of Graham, Texas

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200,000 feet
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BOILER TUBING

Seamless, excellent used condition
Ideal for gas lines

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FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: One String of Cable Drilling Tools complete with Casing and Derricks. Contact H. H. Blair, 600 Bitting Building, Wichita, Kansas. Telephone #7-3241.

G-17S—Post War Stagger Wing. Flush Cowl Serial No. B-15. Mfg. Feb. 1947. Relicensed until May 1952. Repainted Red with White Trim. Total Time 1400 hrs. Engine-14B, Prop., Accessories 400 hrs. Fabric and wood Guaranteed Perfect. Very Clean Interior, MN-26C Loop. Full Instruments. Last Stagger Wing off Beach Production Line. No trades. Contact John Lyon, Aviation Dept. Malco Refineries, Inc., Roswell, New Mexico.

FOR SALE: One Wilson Schneider pump. Size 6X16. Serial No. 10780. Stearns Petroleum, Inc., Box 313, Russell, Kansas.

FOR SALE
SEAMLESS CASING & TUBING

5,000′ #1 Used H-40 5½" O.D. 8 R.T., R.2
3,000′ New H-40 7" O.D., 17# 8 R.T., R.2
3,500′ #1 Used H-40 7" O.D., 8 R.T., R.2
40,000′ #1 Used 2⅜" O.D., 4.60# 10 R.T., & 10 V.T., R 1 & 2

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6,000′ #1 Used 7" O.D., 17# Good condition
3,000′ #1 Used 8⅝" O.D., 24#

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IMMEDIATE delivery complete workover Jack Knife Rig. Details and price on application. P. O. Box 3246, Corpus Christi, Tex.

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200,000′ ½" Standard Black Pipe, Plain Ends, 21′ Lengths.
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75,000′ 2¼" O.D. x Approx. .140" Wall 3.2# Reconditioned Seamless Tubing, Plain Ends, 14′ Lengths and Over.
38,000′ 3" Standard Black Pipe, Plain Ends, 21′ Lengths.
45,000′ 3½" O.D. x .145" Wall 5.4# Reconditioned Seamless Tubing, Plain Ends, 14′ Lengths and Over.
16,000′ 4" Standard Black Pipe, Threaded and Coupled and Plain Ends, 21′ Lengths.

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EQUIPMENT FOR SALE

FOR SALE: Two 6-cylinder Hydraulic casing pulling machines. One 7", 5", 3", seven foot jacks; one 5", 3", four foot jacks. Box E-128, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Bucyrus-Erie Model 36-L Spudder, dual Tires Semi Trailer mounting, Waukesha gas-gasoline engine working now, with or without tools, immediate delivery. Phones 1-5711, 1361, 0421, Ashland, Ohio, 19½ East Main Street.

FOR SALE: 5170' Internal Upset 2⅞" Grade "D" Drill Pipe 10.40#, Range 2, 1 ¼" ID W/Reed FH Tool Joints. Good condition, $1.40 per ft. Lum Price, 417 E. 16th, Houston 8, Texas. Underwood 8945.

FOR SALE: Mayhew 2000 drill. Has drilled two 1000-ft. and one 1700-ft. holes. Mounted on GMC 6 x 6. Has new 145 H.P. auxiliary engines. Rig, elevators, slips, Misc. tools—cash price $17,500. Drilling Bit & Supply Co., Princeton, Indiana.

7¼" x 12" MUD PUMP

Model FXZ Gardner-Denver 7¼" x 12" Mud Pump Complete mounted on skids. This has been completely overhauled this month and $2100 of new parts were installed. Priced for a Quick Sale.

MOUNTAIN IRON & SUPPLY CO.
714 Fourth National Bank Building
Wichita, Kansas
7-4238 L.D. 239

EQUIPMENT FOR SALE

FOREIGN SEAMLESS CASING
A. P. I. Specifications. Subject to letter of credit. Box E-179, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 72 Star Spudder semitrailer, large reinforced mast, full string tools, 1½ ton Chev. truck. Phone 6443. J. Amey, Ponca City, Okla.

FOR SALE: 1—1947 Model GMC Diesel Tandem 65 Tulsa Winch air equipped. 20 foot body. 12" Roller, 1100x22 tires, is good truck in top shape. Too large for this field. Box 706, Drumright, Oklahoma.

FOR SALE: National 50 rotary drilling rig, NKU Waukesha engines, new Lee C. Moore 130' 515,000# capacity mast with substructure, new 7¼ x 14 Gardner-Denver pump, good drill pipe, everything complete and in first-lass condition. H. Waggoner Drilling Co., Box 4657, Oklahoma City, Okla. Phone 64-1413.

FOR SALE: 2—2 KVA Dry Type Transformer. 1—3 KVA Oil Filled Transformer. 6—Secondary Racks. 1—30 KVA Alternator with exciter, switchboard, and accessories. 5—Fractional H.P.-110V DC Motors. RIGDON & BRUEN OIL, Sedan, Kansas.

FOR SALE—TANKS

2—80,000 bbl. Tanks, Hominy, Oklahoma.
2—55,000 bbl. Tanks, Maud, Oklahoma.
All Steel—will cut down, match mark, load on cars.

W. C. BERRY
Phone 3-6141, Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: For immediate delivery one 55 M. BBL. All-steel oil storage tank, match-marked for reerection. Clyde Dampf, Amarillo, Texas. Phone 6-5816, Box 2515.

WELL EQUIPMENT: New and used spudders, rotaries, core drills—all sizes and types. Cable tools, drill pipe, bits, pipe, Fishing tools. Everything for Well Service. Pressey & Son, Pueblo, Colorado.

10 INCH seamless pipe like new, $5.00. Eight inch lapweld 28 pound $3.00; 24 pound $2.50. Seven inch lapweld 20 pound $2.00; 17 pound $1.75. Five inch lapweld 13 pound $1.50. Welded tanks, 100 barrel, $350.00. 1208 E. 20th St., Tulsa. Phone 39232.

11,500 GAL. 200 lb. pres. U201 propane tank, 25,000 gal. 75 lb. pres. butane tank. L. M. Stanhope, Rosemont, Pa.

PORTABLE DRILLING rig 2000 ft. capacity for core drilling water well or shallow production. Completely overhauled like new ready for work. 1738 Proctor, Dallas, Texas. Phone Elmhurst 1154, Greenwood Machine & Engineering Co.

FOR SALE: Bucyrus-Erie 36L Skid type Waukesha powered. Complete five and seven inch drilling tools, steel tool house, Kohler light plant, New ⅞ X 4500 Drilling line, ⅞ X 4500 sand line, ⅞ X 450 tubing line. Complete set rod and tubing tools, good timbers, and flooring, steel dump box, and steel tool rack. Rig is in A-1 shape and running at present time. Can give immediate delivery. Two Wilson rod and tubing units, single and double drum, with telescoping poles, complete with all tools and mounted on trucks. Crew cars to go with each unit. Both units fully equipped and in A-1 shape. Guss Irvin Well Servicing Co., Box 112, Stinnett, Texas. Phone #1.

STEEL TANKS

FOR SALE—STEEL TANKS, 5 round, 11,000 gal. cap.; 4 rectangular, 15,000. STEEL CONTAINERS, round, wt. 420 lbs.; 300 gal. cap.; 37½ x 44 x 490.D.

NATIONAL METAL & STEEL CORP.

DEPT. OJ, Terminal Island (Los Angeles Harbor), Calif.

Phone: Los Angeles — Nevada 6-2517

CASING—TUBING

10,000' of 4½" OD, R-2, used seamless casing, new 8rd. thrds. and new casing couplings.

20,000' of 2⅜" OD, 4.60#, 11½ V thrd., 24' lengths, regular, used seamless tubing.

3,000' of 2⅜" OD, 4.70#, 8rd. thrd., R-2, EUE, used seamless tubing.

BROWN PIPE & MACHINERY CO.

P. O. Box 2368, Phone 3-9391, Corpus Christi, Texas

PRESSURE VESSELS

Quantity	Description
1	4' x 40' x 4" Forged Seamless
1	10' x 30' x 7/8" Riveted & Welded
2	10' x 30' x ½" Riveted
2	9-2 x 39' x 1 7/16" Riveted & Welded
1	10' x 39-9 x 1⅛" x 1" Heads—Riveted—3 Trays x 63 C.I. Bubble Caps/Tray—3 Baffle Plates rated 750 F.
1	6' x 28' x 3/8" Riveter—16 Trays, Spacing 16"
1	5' x 12-6 x 5/16" Riveted & Welded 5 trays-spacing 20"
1	5' x 30' x 3/8" Riveted & Welded, with Tulsa Type Mist Extractor 10 trays-spacing 20"
1	3-6 x 50' x ½" Riveted & Welded—4 trays with 16" spacing; 2-4 x 10' condenser on top
3	5' x 28' x 5/16" Riveted & Welded

STEEL PIPE

6,000' 28" O.D. x .312 Wall Thickness—85.55 lb./ft., 40-50' lengths

CAST IRON PIPE

Quantity	Size	Ends	Class
2,000'	24"	B&S	200
1,500'	18"	do	200
2,160'	14"	do	200
454'	12"	do	200
625'	8"	PE	150
123'	8"	PLG	150
351'	6"	PE	150

BROWN-STRAUSS CORPORATION

1546 Guinotte Phone: Ha. 1000
Kansas City 10, Missouri

FOR SALE—*AT COST*
AVAILABLE IN ONE LOT FOR IMMEDIATE SHIPMENT

3—DIESEL TORQUE CONVERTERS

Engines: Twin GM Model 6-71 (Completely Remanufactured and Guaranteed)
Torque Converters: New Twin Disc Model F

1—DIESEL POWER UNIT

Engine: Twin GM Model 6-71 (Completely Remanufactured and Guaranteed)
Reduction Gear: New GM 1-77:1 Heavy-Duty

DIESEL DIVISION—NATIONAL METAL & STEEL CORP.
Dept. OJ, Terminal Island (Los Angeles Harbor), Calif.
Telephone: Los Angeles—Nevada 6-2517

EQUIPMENT FOR SALE

2500 12¾" O.D. Line pipe couplings, also 100 16" O.D. NEW and Used. Reasonable. A. A. Gilbert Pipe & Supply Co., P. O. Box 986, Shreveport, La.

FOR SALE: Ideal slush pump, Model C-150. Melton Supply Company, Seminole, Oklahoma.

COMPLETE Rotary Rig, mounted Dodge Truck, ballbearing throughout, 2000 foot capacity 5½X10 mounted mudpump, Mission equipped. 700 feet 2⅞ drill pipe, 12 pounds. Water tank, tools. Two men operate. Forced Sale, Box 106, Seminole, Oklahoma.

ONE—6¼" x 30' American HT Drill collar; 1—XAHU Waukesha Engine; 1—13¾" Pilot Surface Bit; 2—4" x 5" Piston Type Water Pumps with engines. B. L. Rucker, Phone 1072 or 480, Mount Vernon, Illinois.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

EQUIPMENT WANTED

WANTED: Good used well drilling equipment. Spudders, rotaries, large or small. Tools and general equipment. We distribute throughout the West with hundreds of customers. Pressey & Son, Pueblo, Colorado.

WANTED, portable rotary Drill Rig, truck mounted for coring and slim hole to 3,000 ft. with tools and pipe complete. Must be in good condition and ready to work. T. R. Davis, Dixie Drilling Company, Vidalia, Georgia.

WANTED: Four Class B-36 strut type 500# W. P. C. & G. Cooper Company used compressor assemblies including cylinder bases. See Cooper spare parts sheet CB-36-3. Contact Cities Service Gas Company, C. D. Rogers, P. O. Box 1162, Wichita, Kansas.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

OPERATING OIL REFINERY

INDEPENDENT would like to buy operating Refinery, Gasoline Plant, or Petrochemical plant with or without producing properties. Buyer amply financed—Particularly interested in substantial size facility.

Reply Box E-180

The Oil and Gas Journal, Tulsa, Okla.

Oil Tankage Wanted

Tankage needed by major oil company; all sizes 2500 to 96,000 barrel capacities, cone and floating roofs. Give age, dimensions, condition, general locations and prices. Box E-201, The Oil and Gas Journal, Tulsa, Okla.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908 Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

HELP WANTED

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $3.00 Oil Industry Mailing List, Box 2003, Tulsa, Okla.

APPLICATIONS now being received from Petroleum, Chemical and Mechanical Engineers with a Ph.D. degree and petroleum reservoir engineering experience for teaching positions on the petroleum engineering staff of a Southwestern institution. Salary based on background. Initiative essential. Interviews during July and September. Appointments effective September 1. Consulting and research encouraged. Send all data including a recent photograph to Box E-191, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING contracting and oil producing company wants man experienced in producing and completing wells. Duties will be with both contract drilling and producing operations. Age 30 to 35 years. Area Ark-La-Tex. Replies confidential. Box E-187, care of The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE to head up new department of an engineering company to do exploratory drilling and develop petrochemical opportunities. Top level experience and connections required. Give specific qualifications and experience. Box E-197, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

SEISMOGRAPH

Aggressive growing contract company, wants Party chief, Computator, Operators, and surveyors, with Rocky Mountain area experience. Box E-190, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTRACTIVE opening for young Pet. Eng. for production engineering work on eastern Kansas waterflood projects. Give complete statement of qualifications, references and present salary. Brundred Oil Corp., 208 Nichols Road, Kansas City 2, Mo.

LP GAS SALES ENGINEER

Eastern producer desires LP gas sales engineer preferably experienced in sales to dealers, industrial plants, and utilities. Please state full particulars and experience in reply to A-91, P. O. Box 3575, Phila. 22, Pa.

GAS ENGINEER

For consulting organization in New York. Must be graduate engineer, be up to date technically, have 5 to 10 years experience preferably with natural gas operating utility and be qualified to make economic, operating and planning analyses. Salary range in accordance with qualifications. **Box E-192, The Oil and Gas Journal, Tulsa, Oklahoma.**

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL

for

LARGE INTERNATIONAL OIL CO.

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-143, The Oil and Gas Journal, Tulsa, Oklahoma

WANTED ENGINEERS

by

An American oil company in South America

REFINERY ENGINEERS—College degree and several years' experience in oil refinery design or maintenance required.

PIPELINE ENGINEERS—Must be graduate engineer and have approximately 10 years' experience in design, maintenance or operation pump stations, terminals, trunk pipe lines.

MECHANICAL ENGINEERS—Must have Mechanical Engineering degree and several years' experience preferably in oil field operations. Should have knowledge oil field installations, pipeline equipment and pumping operations.

EQUIPMENT INSPECTORS—Graduate engineers with minimum of four years' experience in oil refinery inspection.

CORROSION ENGINEERS—Degree and minimum of five years' experience in corrosion engineering required. Must be able to investigate and recommend solutions to corrosion problems involving land and marine pipelines, tanks, marine equipment, and other mechanical equipment.

Write giving complete address, marital status, education, and complete experience resume.

Box 308-G
Radio City Station
New York 19, New York

HELP WANTED

WANTED: Seismologist for permanent assignment division office in Tulsa. Reply Box E-168, The Oil and Gas Journal, Tulsa, Okla.

WANTED: First-class refinery mechanic. Must be experienced in gas compressor work. New Mexico Asphalt & Refining Company, Box 367, Artesia, New Mexico.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

WANTED—RESERVOIR ENGINEER

EXPERIENCED RESERVOIR engineer, by well established, progressive company in Mid-Continent area. Good opportunity for future. Must have not less than 3 years practical experience. Submit qualifications, scholastic training and experience in first letter. Replies confidential. Box E-195, The Oil and Gas Journal, Tulsa, Oklahoma.

OVERSEAS POSITIONS

Accountants, Auditors to	$9600
M.E. Juniors, Equipment inspection construction	$6000
M.E., C.E., ChE. Srs. & Jrs. to	$9600
Stock Men, oil wells or Construction	$5400
CE., EE, Construction, Industrial Plant	$7440

MAINTENANCE SUPPLIED—FEES REFUNDED ON COMPLETION OF CONTRACT

Many Other Openings!

UNIVERSAL TECHNICAL AGENCY
154 Nassau St. NYC, New York

WANTED
Production Superintendent

by one of the oil industry's oldest and largest manufacturers.

Must be capable of directing manufacture of Oil Field Equipment, Valves and Defense Work including light and heavy machining.

This position offers additional executive opportunity to a capable man.

Salary—Good, because the man must be good.

Location—Heart of the Mid-Continent Area.

Reply to Box E-184
The Oil and Gas Journal
Tulsa, Oklahoma

PROCESS ENGINEER

Experienced in the design and operation of general and petro-chemical plants.

ESTIMATOR

Thoroughly familiar with all phases of refinery and chemical plant construction.

MECHANICAL DESIGN ENGINEER

Experienced in the design of specialties such as expellers, extractors, mixers, conveyors, elevators, etc.

Apply by mail giving education and experience record in detail; also note marital and military status. Personal interviews will be arranged for qualified applicants.

Opportunity for advancement with an expanding organization. Well defined and attractive vacation, insurance, and retirement plans.

CHEMICAL PLANTS DIVISION
BLAW-KNOX CONSTRUCTION CO.
PERSONNEL DEPT.
P. O. Box 1286 Tulsa, Oklahoma

HELP WANTED

WANTED—Refinery instrument men. Cat cracking experience necessary. New Mexico Asphalt & Refining Company, P. O. Box 367, Artesia, New Mexico.

WANTED by independent oil company, young lawyer, with some experience or recent graduate. Application must be in own hand writing. Give qualifications and experience. Box E-185, The Oil and Gas Journal, Tulsa, Okla.

AGGRESSIVE OIL EXECUTIVE—Substantial independent producing company wants aggressive, high type, responsible executive as Manager West Texas-New Mexico Division. Applicant should be under 35 years of age, 10 years experience land and geological work preferably West Texas-New Mexico area. Applicant must be equipped to find and negotiate for wildcat, undeveloped, and developed properties and leases, appraise submittals, manage present West Texas office. Excellent compensation. When replying give full details, include photograph. Our present employes not considered for this position. Box E-194, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

POSITIONS WANTED

Methods and Procedures Analyst — Accountant — Auditor. College graduate — age 38. Desire executive or junior executive position in Southwest. Box E-165, The Oil and Gas Journal, Tulsa, Okla.

EXECUTIVE geologist, graduate training, comprehensive experience in exploration, research, and administrative work with major company, exceptional knowledge of oil geology throughout U. S., wants permanent position in Mid-Continent or Rocky Mountains. Box E-171, The Oil and Gas Journal, Houston, Texas.

CHIEF CHEMIST — Presently employed, desires change. Eleven years experience in Manufacture of Motor and aviation gasoline, asphalt and road oils. Age 32. Box E-193, The Oil and Gas Journal, Tulsa, Oklahoma.

LUBRICATING OIL SPECIALIST. Extensive experience in refinery lube operations, solvent treating, clay-bleaching, blending; additive manufacture and lube evaluation. Seeks position as supt. manufacturing and/or development director. Available August 1st. Box E-202, The Oil and Gas Journal, Tulsa, Okla.

CHEMICAL ENGINEER, B.S. Highly experienced in all phases of asphalt refining operations—paving and roofing; oxidations; emulsions, specialties; product development. Executive and creative ability. Over forty-five. Minimum salary $9,000 U. S. or foreign. Available August first for supervisory position in manufacturing and/or development. Box E-203, The Oil and Gas Journal, Tulsa, Okla.

AVAILABLE—Safety Director experienced in oil and gas transmission, production and refining, also other heavy industry. Wish multiple location type industry in South, Middle West or West. $7,500 minimum starting salary. Write Box E-205, The Oil and Gas Journal, Tulsa, Okla.

CHEMICAL ENGINEER: Desires position with oil company or allied industry. Eight years experience in Plant Technical Service and Production Supervision, on Gasoline Plants Refineries and Petrochemical Plants. Box E-175, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST desires return to foreign employment. Total of 22 years foreign experience. Last 13 years in Latin America with major oil company; previous 9 in Near East. Box E-139, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

CORPORATION TAX ACCOUNTANT. Eight years experience Oil and Mining industries. Federal, state, local and foreign taxes. Full preparation, filing all returns, protests and claims. Direct negotiations with Revenue Agents. Technical memoranda on depletion, intangibles, miscellaneous taxes, new ventures, etc. Fluent Spanish. Desires long-range connection. Write Box E-186, The Oil and Gas Journal, Tulsa, Okla.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

PETROLEUM Geologist with five years experience in the Texas and Oklahoma Panhandle, would like a position with a company planning to open an office in the Panhandle. Box E-164, The Oil & Gas Journal, Tulsa, Oklahoma.

TOOL PUSHER
20 Years Experience
Desires permanent employment with independent oil company. Box E-117, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST—Major company training, desires position in Houston. 12 years experience. Care of Box E-182, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-938, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Aggressive independent or small company desiring high quality, low cost geological and land representation West Texas, Rocky Mountain and/or Gulf Coast areas. Sound proposition. Box E-178, The Oil and Gas Journal, Tulsa, Oklahoma.

Division landman with major company twenty years experience, ten years present job, desires change. Prefer district landman's job with large independent or major company. Box E-170, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST wants to work, learn, and help find oil. Five years total varied oilfield experience. Box E-200, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER desires new connection. Twenty years operating and engineering experience, refineries, gasoline plants and construction companies. Present employment, Project Engineer. Age 50 years. Box E-198, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL Engineer—with several years experience in absorption, extraction, and fractionation of light hydrocarbons, testing and blending of petroleum products, and some refinery experience desires change from present position, Texas or vicinity preferred. Box E-199, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

EXECUTIVE SALES REPRESENTATIVE

Mid-Continent Area. Oil and Industrial field. Strong Mechanical background. Sales, Sales promotion or training and supervising. Presently employed. Excellent reasons for change. Box E-196, The Oil and Gas Journal, Tulsa, Oklahoma.

GIFTS

TITANIA GEMSTONES

Can supply the sensationally beautiful Titania gemstones, the only thing on earth more brilliant than the diamond, all facet cut and at a small fraction of the cost. Please that little lady with one of these marvelous gems. Ask for description.

C. C. Boak, Tonopah, Nevada

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

LOCAL CAPITAL FOR
production, producing royalties, over-rides, oil payments, drilling deals, working interests, large or small. Must have merit. Prompt action. Give full details. Box E-161, The Oil and Gas Journal, Tulsa, Oklahoma.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

KANSAS OIL DEALS WANTED: Reputable independent operator and producer solicits your drilling deals. Box D-974, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL act as your buying agent for oil and gas leases and royalties in the Mid-Continent and Southeastern States fields. C. W. Deming, P. O. Box 1874, Tulsa, Okla., or Box 320, Waycross, Georgia.

FOR SALE: Clinton gas well. Oil in stray sand. Inquire W. E. Schrock Tire Shop, Millersburg, Ohio.

FOR SALE: 640 acres Big Horn County, Wyoming (very hot); 20,000 acres in Central and Eastern Montana (scattered counties); 30,000 acres, North Dakota; 30,000 acres, South Dakota; 10,000 acres, Colorado; 30,000 acres, Nebraska (scattered counties). Prices and terms to properly interested parties. Dyer O.J. 1835 Champa St., Denver, Colorado.

WILL DEAL 6400 acres 10 year oil and gas leases. Located in 5 W.—19 S. of Sierra County, New Mexico. Altitude and Latitude comparable to Artesia pool. Near R. R. and Highway. No tests of importance ever drilled near. O. S. Fierbaugh, P. O. Box 1396, Albuquerque, New Mexico.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases. Drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

WANTED: Proven West Texas leases. Will pay cash and override. Box 2626, Odessa, Texas.

FOR lease on one-eighth basis for oil and gas 100,000 acres on the Cumberland Plateau in Tennessee for test drilling. This plateau is a part of the Appalachian Coal oil and gas field, and is Tennessee's coal basin. Both oil and gas is being produced from wells nearby. G. E. Harrison, owner, Crossville, Tennessee.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

S. E. NEW MEXICO
Wells drilled into San Andreas (Permian) lime indicate flowing production in 3 oil zones. S W Roosevelt County. Also deep sand possibilities in this major area. Drilling wells under way. We recommend leases or royalty on structure. Details on request.
W. J. PETERMAN, GEOLOGIST
Portales **New Mexico**

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

LEASE AND DRILLING BLOCKS

I OWN and offer a leased block of 1,000 acres in favorable location Creek County, Oklahoma. Will make an attractive drilling deal with reliable producer. Address E. P. Kirschner, 409 Commercial National Bldg., Muskogee, Oklahoma.

OIL and gas lease on 10,000 acres in Hugoton Embayment and Anadarko Basin, Western Oklahoma. John P. Mathis, Box 1106, Amarillo, Texas.

BUSINESS OPPORTUNITIES

CAPITAL TO INVEST. Engineer will purchase all or part interest in a substantial equipment or engineering company. Box E-206, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: Undivided 105 mineral acres or part thereof, Sections 14-15, Block C-9, A. Rowe Survey, Donley County, Texas. Good title. Howard Stormon, Rolla, North Dakota.

FOR SALE: Tungsten mine 21 claims large tonnage in sight. Inspected and O.K.'d for government loan—approximately 10 miles from railroad. Box E-204, The Oil and Gas Journal, Tulsa, Okla.

PRODUCTION FOR SALE

FIFTY ACRES producing oil royalty and three leases making 110 barrels daily production. Liquidation of estate. P. O. Box 26, Tulsa, Oklahoma.

REAL ESTATE

MODERN well-planned homes in restricted district. Residential, commercial and industrial properties. Clem Casey, Bismarck, N. D.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

NOTICES

National Oil Company of Iran

Notice of Sale of Oil Products

In accordance with article seven (7) of the Law Regulating the Nationalization of the oil industry in Iran, all purchasers of Petroleum products from Iran for export are hereby notified that they can within one month from the date of this notice obtain delivery of the oil products they require against receipt but they must refer to the Board of Directors within one month of the date of this notice and effect payment at the standard international rates.
After the expiry of the above period of one month, the sale prices shall be at the standard international rates for quantities which customers of the former AIOC have purchased during the period between January first 1948 and March twentieth 1951. For any quantities exceeding these, they shall have priority in purchasing, other terms and conditions being equal. Provisional Board of Directors in charge of enforcing the act concerning the Nationalization of the oil industry in Iran by G. A. Vahid dated at Khorranshahr, June thirteenth in 1951.

Canadian Fields

(Continued from page 167)

Ltd., 38 per cent by Devon-Leduc Oils, Ltd., ploration, Ltd., Devonian Royalty Corp., Ltd., and John Michaels.

After drilling the Cambrian down to 10,501 ft., at its MacKid 1 wildcat in the Okotoks area of southern Alberta, Shell Oil Co. has plugged back for tests of natural gas prospects in the Devonian. Although some natural gas has shown during tests, it is not possible as yet to determine whether commercial gas production will be obtained at the well. The MacKid 1 is located in LSD 1, 19-21-28w4, about 15 miles south of Calgary and 6 miles north northwest of Okotoks town. The hole was plugged back to 8,686 ft., acidized with 2,000 gal., and a 9¼-hour drill-stem test run of the upper Devonian interval at 8,490-8,560 ft. During the test, with ½-in. bottom-hole choke, the well flowed some hour gas and recovery was 1 bbl. of spent acid. A further 4,000-gal. acid treatment was applied, and while swabbing the well flowed natural gas (again in unspecified volume), plus water and spent acid. During drill-stem tests run while drilling through the Devonian, the well rated natural gas at around 500,000 cu. ft. daily. The top of the Mississippian (Madison equivalent) also showed some 400,000 cu. ft. of gas on tests on the way down.

Canadian Superior Oils of California, Ltd., started gun-perforating this week at its Robertson 9-26 wildcat in the West Didsbury area, 30 miles north northwest of Calgary. Further perforating and testing should determine whether or not the well is a discovery in Madison limestone and Lower Cretaceous sands. On previous tests, the Madison gave fairly substantial natural gas flows plus slight oil showings, while the Cretaceous sands above had some gas and slight oil showings. The well went on to 10,553 ft., deep in the Devonian formation, without finding encouragement in this section. The hole has been plugged back to 8,430 ft., and 7-in. casing set at 8,275 ft. with 400 sacks of cement. The first gun-perforating and testing is being done in the Madison section a short distance above the casing base. The well site is LSD 9, 26-39-3w5.

CANADIAN SUCCESSFUL WILDCAT

Royalite-Stony Plain 2, LSD 6, 23-52-26w4, TD 5,068 ft., 1,396 bbl. oil.

CANADIAN WILDCAT FAILURES

Socony-Gartly 1, LSD 5, 16-30-19w4, TD 5,662 ft.
Socony-Entice 1, LSD 12, 25-28-24w4, TD 8,478 ft.
Tor-Socony-Holden 1, LSD 9, 18-50-15w4, last depth reported 3,903 ft.
Delhi-Socony-Link Lake 2, LSD 9, 1-33-17w4, TD 4,295 ft.
Britalta-Deep Rock-Many Islands 6, LSD 10, 14-16-3w4, TD 1,760 ft.
Central-Del Rio-Redwater 1, LSD 31-57-20w4, TD 3,913 ft.
Delhi-Socony-Standard 1, LSD 9, 21-24-22w4, TD 7,159 ft.
Turkey Hill 1, LSD 5, 6-50-5w4, TD 3,405 ft.

Illinois Fields

(Continued from page 167)

George S. Engle 1 Schmidt, S½ SE SE NE 19-2s-13w, dry, TD 2,887 ft.
Washington County: Spade Drilling Co. 1 Barton, NW NE NW 13-2s-3w, dry, TD 1,267 ft.
Wayne County: Nation Oil Co. 1 Koontz, NE SE SW 8-2s-8e, dry, TD 3,455 ft.
Ralph Halbert 1 Cox, NW NW SE 30-2s-8e, dry, TD 3,432 ft.
White County: John Buchman and C. E. O'Neal 1 Baker Heirs, NE NE SE 2-4s-10e, dry, TD 3,214 ft.
Skiles Oil Corp. 1 Pomeroy, SW SW NW 20-5s-14w, dry, TD 3,117 ft.
Ryan Oil Co. 1 Carter, SE SE SE 3-6s-9e, dry, TD 3,214 ft.
W. O. Lucas 1 Allen, NE NW SE 25-6s-10e, dry, TD 3,027 ft.

INDIANA SUCCESSFUL WILDCAT

Posey County: W. W. Dayton 1 Rueger, SE SW NE 36-6s-13w, IP 50 bbl., Cypress 2,268-77 ft., TD 2,377 ft. (discovery well Caborn South pool).

INDIANA WILDCAT FAILURES

Gibson County: V. R. Gallagher 1 Garrett, SEc SE NW NE 26-2s-13w, dry, TD 2,852 ft.
Knox County: Graham Development Co. 1 Day, NW SW SW 27-2n-8w, dry, TD 1,563 ft.
Walton Drilling Co. 1 Thompson, NE SW NW 23-4n-10w, dry, TD 1,711 ft.

Perry County: T. R. Lindsay 2 Hempbling, NW SE SW 21-5s-3w, dry, TD 545 ft.
Posey County: Aurora Gasoline Co. 1 Heerdink, SW NE NE 17-7s-14w, dry, TD 2,920 ft.
Sullivan County: F. B. Cline 1 Hess, NE SE SE 7-8n-10w, dry, TD 1,696 ft.
Venderburgh County: Coy Oil Co. 1 Reese, NE NW SW 8-6s-11w, dry, TD 2,96 ft. R. E. Hupp 1 Elikofer, NE NE SE 14-7s-10w, dry, TD 2,339 ft.
Vermillion County: A. C. Allyn 1 Buntain, NE NE NW 34-14n-10w, dry, TD 917 ft.
Vigo County: R. E. Stander 1 Welch-Dunlap, C SL SW SW NW 27-13n-9w, dry, TD 1,630 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCATS

Henderson County: George S. Engle 2 Mattingly, S½ NW SE NE 2-O-22, IP 20 bbl., Cypress 2,260-63 ft., TD 2,267 ft. (extension Corydon East pool).
Tuley & Carter Drilling Co. 1 Chase, NEc NW NW 19-Q-26, IP 220 bbl., McClosky 1,965-75 ft. and 1,986-92 ft., TD 1,995 ft. (extension Reed pool).
McLean County: G. L. Reasor 1 Pinkston, C W½ SE SW SW 8-N-27, IP 56 bbl., Hardinsburg 1,626-33 ft., TD 1,640 ft. (extension Cleopatra pool).

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: Skiles Oil Corp. 1 Evans, NE NW SW SW 1-O-30, dry, TD 1,557 ft.
Henderson County: Dale Hopkins 1 Farley, NW SW NE 5-O-25, dry, TD 2,580 ft.
J. B. Buchman and Basin Drilling Co. 1 Tucker, SEc SE SW SW 24-Q-26, dry, TD 2,194 ft.
Webster County: Felmont Oil Co. 1 Allen, NE SE SW 15-N-23, dry, TD 2,778 ft.

EASTERN KENTUCKY

ASHLAND.—In Magoffin County and on Short Fork of Burning Fork, Oliver Jenkins has added another oiler to the Mine Fork pool. His 5 Elkhorn Coal Corp. initialed 6 bbl. oil per day from Weir (Mississippian sand) at a total depth of 1,367 ft.

In Lee County and in the Big Sinking pool, Ashland Oil & Refining Co. topped Corniferous lime at 830 ft. on 21 Simpson Crabtree and were coring ahead at 873 ft. Well is located on Cave Branch of Big Sinking Creek.

In northwestern Johnson County and on western edge of Martha pool, Ashland Oil & Refining Co. topped first Weir sand at 890 ft. and second Weir at 951 ft. Operators cored to total depth of 976 ft. and recovered saturated sand. Tubing and rods will be run for a test.

EQUIPMENT MEN

(Continued from page 175)

Acidizing Company Plans Radio Communication System

Chemical Process Co., division of Independent Eastern Torpedo Co., Breckenridge, Tex., has announced plans to expand its two-way FM-radio system to cover entire acidizing operations in the Southwest. Ten base stations are being installed throughout Texas and New Mexico, and G. R. Whitney, vice president in charge of acidizing, has announced that eight additional stations will be installed in Louisiana, Oklahoma, and Kansas.

The 18 two-way radio transmitters will be located at the company's acidizing stations and, in conjunction with mobile-radio units in cars, the stations will facilitate the dispatching of acidizing engineers, acidizing trucks and equipment. They also will provide a means of communication whereby field men may request additional equipment or supplies direct from the well locations.

Pacific Sales Engineers Appointed by York Co.

Otto H. York, president of Otto H. York Co., Inc., process-equipment manufacturers and engineers, announces the appointment of Jacobs Engineering Co., Los Angeles, as sales engineers for the Pacific Coast region.

Under the direction of Joseph J. Jacobs, Jr., and Harry Vinoch, the newly appointed organization will handle all Pacific Coast sales and engineering for the York line of wire-mesh entrainment separators and mist extractors, multistage liquid-liquid extraction equipment, and wire barriers, used in the petroleum and allied industries.

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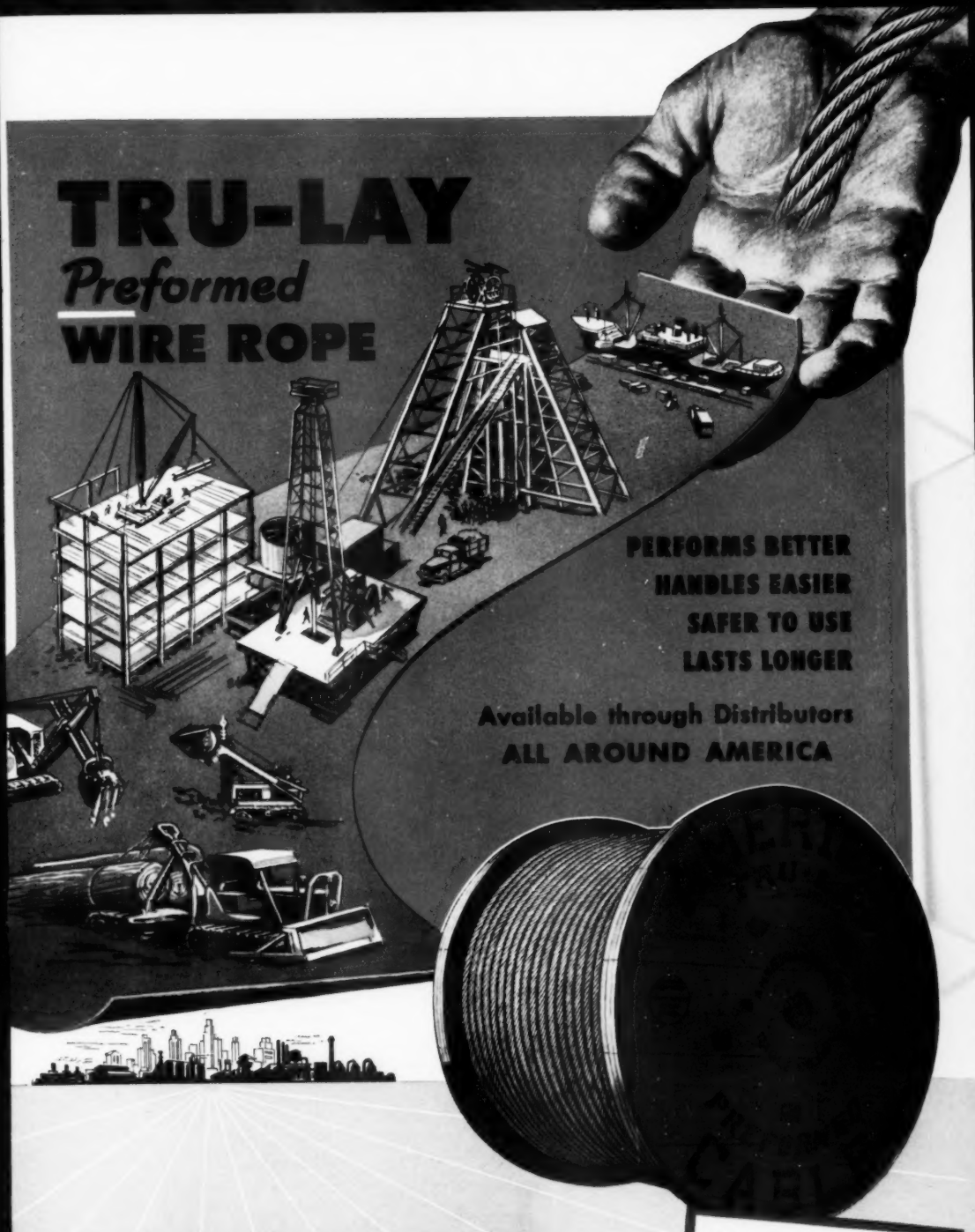

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